Southwestern Medicine

VOL. I. El Paso, Texas, April, 1917. No. 4

DIFFERENTIAL DIAGNOSIS AND TREATMENT OF DUODENAL ULCER.

BY

DR. M. K. WYLDER, Albuquerque, N. M.

(Read before the 35th Annual Meeting of the New Mexico Medical Society, Albuquerque, New Mexico, October 11-12-13, 1916.)

'Tis only in recent years that diagnosis of duodenal ulcer has been made with much frequency. To Moynihan's classic description of duodenal ulcer is our ability to recognize this condition in its early stages largely due.

Duodenal ulcer usually presents the following train of symptoms: The patient complains of pain in right upper quadrant of abdomen, and of flatulence and belching; seldom of nausea, or burning in stomach region. This pain cames on from one to four hours after taking food; is relieved by taking of food—the more food taken the longer the relief is felt. The explanation of this is that when food is taken the pylorus is open for a greater or less time, according to the amount taken, but when the stomach empties itself, and the pylorus closes, the squeezing of the ulcer by the constricting of the pylorus causes pain, which is relieved almost immediately on taking of more food. The examination reveals tenderness at the pyloric spot, which is located one and one-half inches above the umbilicus, and one and one-half inches to the right of the mid-line. The gastric contents reveal a hyperacidity. Some even claim that hyperacidity is duodenal ulcer, and no less a personage than Moynihan is among this number. This condition is to be differentiated from gastric ulcer, gall bladder diseases, chronic pancreatitis, and chronic appendicitis. Chronic pancreatitis we can eliminate at once, as at present it can only be diagnosed post mortem. Chronic appendicitis may give rise to nausea and pain, referred alone to the pyloric region, in which the patient does not even suspect trouble around the appendix, but on examination, if the trouble is in the appendix you will always get either rigidity or tenderness or both over the region of the appendix. Gastric ulcer may cause many of these symptoms. Indeed it is impossible to differentiate a gastric ulcer just inside the pylorus from one just outside, except that perhaps the pain would begin sooner, but in gastric ulcer the taking of food makes the pain more severe—often a gastric ulcer patient is afraid to eat because on taking a few mouthfuls the pain is so severe he is forced to stop.

The pain in gastric ulcer is more severe, and more acute on percussing over the stomach. In gastric ulcer you will find an area perhaps not more than 1 inch in diameter, which gives severe pain every time on percussion. This pain is quite different from the dull pain of duodenal ulcer. Then vomiting in duodenal ulcer almost never occurs. In gastric ulcer it is quite common, and quite severe. It is simply an effort on the part of the stomach to rid itself of the food and acid contents, which cause the irritation. However, the vomit from gastric ulcer seldom contains regurgitated bile. It is simply the gastric contents. A gastric ulcer case is usually constipated, while a duodenal ulcer case is not so apt to be. Hemorrhage may accompany either, and the blood may go either way. A duodenal hemorrhage may be vomited up, or a gastric hemorrhage may pass through the bowels, so this is not a differential point between the two classes of ulcer, but is quite a factor. When it comes to differentating between ulcer and gall bladder trouble it becomes a very decisive point. The laboratory finding in gastric and duodenal ulcers are practically identical. In neither do we get chill or fever or other signs of infection. In gall bladder disease we get the pain in much the same region, but the pain is of altogether a different type. In gastric ulcer the pain comes with eating, in duodenal ulcer it comes on after eating. In gall bladder disease the pain comes on just any time; lasts perhaps two or three days, then passes off for a time. A patient with gall bladder trouble vomits, but he vomits bile with great retching, and any of you who have been sea-sick will agree with me that bile is a splendid emetic. The old idea that if you have stone in the common duct, the bile can not flow has been exploded. The bile usually gets by. 'Tis only a small percentage of gall stone cases that show pronounced icterus. In gall bladder disease you have the same belching and indigestion that you get with the chronic appendicitis or gastric or duodenal ulcer. In gall bladder we also get signs of infection, fever, chill and headache. A stone in the neck of the gall bladder may cause infection, and may give temperature curve, very much resembling that of malaria. A gall bladder case is apt to give a history of appendicitis, typhoid fever, or duodenal ulcer, which are the principal causes of gall bladder disease.

In the treatment of duodenal ulcer, if we but consider the mechanism of the pain we must keep the patient in bed for about six weeks to keep the ulcer quiet, so that it will heal much quicker; and must feed him about every two hours, day and night, so as to keep him free from pain; and what shall we feed him?

At first only sweet milk, buttermilk, gelatin, and water. This can be increased with caution after about six weeks. Six weeks rest and proper diet will usually rob a duodenal ulcer of its symptoms, but it is not cured in this time. It is only symptomatically cured. It takes at least six months to heal an ulcer, and the patient must be willing to follow a very careful regime for that time, if he cares to get well. Of course we must give the patients plenty of alkalies; put from fifteen to thirty grains of sodium

bicarbonate in each glass of water—according to the acidity to be overcome—and use calcined magnesia—one-half dram three times daily. This will help to overcome acidity, and also acts as a light laxative. The question of surgical treatment should be discussed. Some surgeons hold that the diagnosis of duodenal ulcer means gastro-jejunostomy. I believe this view is entirely too radical, as our technic is not so perfect but occasionally a life is lost from this operation. We should think before we do it. In cases that do not yield to medical treatment; in cases where perforation is threatened; in old cases, with stenosis of the pylorus, I should say operate, but in the ordinary average case try medical treatment first, and if that fails you can still operate.

DISCUSSION OF PAPERS OF DOCTOR EPLER AND DOCTOR WYLDER.

Dr. W. L. Brown, El Paso, Tex:—I was not down for discussion of these papers and did not expect to be called on. I may say, however, that I was very interested in hearing both of the papers, and I am particularly glad that one represents what I might say is one extreme of the problem and the other paper the other extreme.

In regard to Dr. Epler's paper, I probably did not quite understand some of the figures, as I got it 20 per cent, of these diagnoses only are made in the old way and 80 per cent by the X-ray. I did not understand whether he meant to infer that he made a diagnosis in 82 per cent. of all cases he rayed, or whether he was correct in 82 per cent of the cases that he made a diagnosis in at all. I am quite sure that a great many of these abdominal conditions we have X-rayed have practically a negative X-ray examination.

In addition, the paper did not deal with the question of gall-stones, which the surgeon in making the diagnosis in the old way had to deal with and has to deal with very seriously.

While I do not wish to decry the use of the X-ray in the gastrointestinal tract, I still, on the other hand, am not ready to admit that we cannot make a diagnosis in more than 20 per cent if we get a proper history and analyze the case properly. I think that gastric or duodenal ulcer would have been the first thing I should have thought of in the first case from the meager history which the essayist has recited, not a complete history by any means in that kind of a case. As to the question of the diagnosis of chronic appendicitis with the X-ray, I do not know just how far the X-ray men claim now to be able to do that. I am rather dubious myself whether that diagnosis can be made in 80 per cent of the cases without the history of the case in in connection with the X-ray examination.

I think that there has been one great trouble in making gastroinestinal diagnoses, or the diagnoses of abdominal conditions. That trouble—it is, at least, one of the great troubles—has been not getting a complete history and not making a complete analysis of the case. I am quite prepared to admit that the pathology does not check up the clinical symptoms, I believe, as a rule. It depends to a great extent on how closely we get our clinical symptoms and how closely we analyze the case. My own personal experience is this: That we rarely find anything in the abdominal cavity, or rarely make a mistake in the examination of the abdominal cavity that we are not able to look back to and say that if we had been just a little more careful in the examination of that case or the history of that case we could have made the diagnosis. If they do not check up, we did not check them up right—that has usually been our experience.

I have never yet seen a perforated gastric or duodenal ulcer that was not preceded by some symptoms. I am not sure that I understood the Doctor rightly in that, but as I did understand him he said that in many cases of gastric or duodenal ulcer the first symptom you have was a perforation. That being true, I do not see how he could have made the diagnosis by X-ray better than by other methods. We have had two perforating gastric ulcers in the last few weeks, one a perforation postperitoneally, and the other a free perforation; and while the free perforation so far as we were concerned at the time did not give any past symptoms, or any past history that would indicate the condition, still the acute perforation always comes in as an emer-

gency and that is not any time to get a complete history. However, after that patient recovered to the extent that he could give a complete history, it was found that he had had the typical history of duodenal ulcer, but at the time the patient was brought the history was unobtainable and in consequence we operated without any definite data, simply on the man's abdominal condition. The other case, the post-peritoneal perforation, was a gradual perforation, not an acute perforation, but was walled in, it perforated the back side of the peritoneum; and in that case, the clinical symptoms and the X-ray findings checked up exactly. The X-ray made the diagnosis, but the diagnosis of duodenal ulcer we had made two years previously. He had been treated for duodenal ulcer, and we would have made a probable clinical diagnosis of the same thing without the X-ray, because the fellow had an acute exacerbation of his symptoms and he had a localized peritoneal irritation which was very suggestive, so suggestive that we would have advised immediate operation without the X-ray. But with the X-ray, in that particular case, it was just as some one said this morning, there was something to show the man right there and it impressed upon him the necessity for immediate operation.

Now I want to say again that I do not arise with any intention of criticising the stand taken by the first essayist, but I simply want to impress the fact that in our own experience nearly all the mistakes we have made we can look back on afterwards and say that all the clinical symptoms did check up with the pathology, but we did not get the clinical symptoms as we should have got them.

Dr. K. D. Lynch, El Paso, Texas:—We all know that we have got in gross cases with typical history of gastric ulcer or duodenal ulcer, and when we have got into the abdomen we have not found an ulcer in either of those situations. I think that is one of the reasons why we should congratulate Dr. Epler upon his excellent paper, which should remind us to be more careful about the diagnosis in a great many of these abdominal conditions.

However, like Dr. Brown, I am not prepared to admit that we cannot make a diagnosis in a great many cases without the X-ray. I think we should use it. I think we should use every means of diagnosis at our disposal, in order to eliminate every source of error possible before we make an incision. I think with Dr. Brown that practically all of us would have diagnosed that first case as a gastric ulcer. On the other hand, there are a great many cases that give a very vague history. The general symptoms, as Dr. Epler enumerated, such as pain, nausea and vomiting, may be not typical at all of any one of three conditions. I think that in a great many of these cases the X-ray might be an important factor in enabling us to localize our diagnosis, either in the lower or the upper half of the abdomen; and I think there are always going to be a certain number of cases in which there is not a typical history, such as gall-stones or the various ulcer types, in which we will have to make an upper incision and expect to find pathology either in the stomach, duodenum or gall-bladder. I do not think that in these cases we are going to localize it before operation to any one of the three organs.

This experience, I believe, is borne out by the experience of surgeons in large clinics, such as the Mayos. They are making larger incisions, they go in for the appendix and in a great many cases also make an upper incision to explore the upper abdomen. They are not content with taking a so-called "chronic appendix" out, but make a pretty thorough exploration, and if there are any symptoms at all to indicate that there is something in the upper abdomen they do make the upper incision and thoroughly explore.

In regard to the second paper, I think that as experience with these cases increases men, even if they do institute medical treatment for gastric and duodenal ulcers, will advise an operation, even when they think the ulcer cured, for the reason that though they think the ulcer cured there is always going to be considerable local pathology due to adhesions. Of course, that would not include an ulcer that had not come through to the peritoneal coat, but there are going to be adhesions between the gall-bladder and the duodenum and to various parts of the omentum and also in some cases to the liver and the abdominal wall.

Dr. E. C. Prentiss, El Paso, Texas:—I have enjoyed these two papers very much indeed. There has been one point brought today which was given considerable stress yesterday, and I think very justly. That is the great value of the history. I think one very frequent source of error in abdominal conditions is the lack of detail and lack of care exercised in the taking of the history; not only that, but the lack of sufficent attention in taking the differential history. Also, of course, there should be a very careful physical examination made.

Now in these cases of gastric and duodenal ulcer which produce severe symptoms for a considerable period of time, nearly all that time they ooze more or less constantly, and I have found that one is almost always able to find occult blood in the stomach contents, both in the gastric and in the duodenal ulcer, from which there is regurgitation into the stomach. I have found in a number of cases that I have operated on for duodenal ulcer there has been occult blood in the gastric analysis at least once and in some cases every time that I would make an analysis. I believe in one case I made analysis five or six times and found blood present every time, and occasionally blood would be present in the stools.

Another test that I think is not used nearly as frequently as it should be where you suspect gastric and duodenal ulcer, and which possibly would have cleared up both the gastric and the duodenal cases of Dr. Epler, is the string test. You put a B. B. shot on the end of a string which is measured to reach two or three inches below the caput duodenalis, have the patient swallow this string at night, and on being pulled out in the morning there will be a stain over where the ulcer was, provided it is not over the greater curvature. In the severe and longstanding ulcers, there is a raw space which gives a stain. Of course, in these gastrointestinal conditions we frequently get very obscure cases; however, I find that with the occult blood in the stomach and stool and with the aid of the string test and with a very carefully taken history we not infrequently clear up an obscure case on careful examination.

In regard to appendix cases, I have run across a great many where the symptoms were in the stomach, but due to chronic appendicitis. Now in the appendix cases as in the gall-bladder cases, where the symptoms are on the part of the stomach, the symptoms before and after meals, due to eating, are irregular. For instance, in an appendix case the patient will have varying symptoms on the part of the stomach, symptoms that will not recur every day as they do in gastric ulcer, every day for a week or two and then have an interval, but will vary from day to day, which as a rule they do not do with duodenal ulcer and are not so apt to do with gastric ulcer. With duodenal ulcer there is generally a uniformity of symptoms, before meals and relieved by eating. In gall-bladder cases with symptoms on the part of the stomach you generally get gas and irregular symptoms with relation to meals that is very suggestive, with practically negative symptoms in the stomach.

I think the X-ray is a very valuable method and will generally clear up the symptoms in gastrointestinal cases—not always, but it is very valuable as showing the location of the stomach, the presence of adhesions, etc.

Another test that I frequently do in obscure cases, with pain in the stomach after eating which makes me suspect gastric ulcer, is to give orthoform in five-grain doses. If the pain is due to an open gastric ulcer, the orthoform will generally completely relieve the pain for a while, or, at any rate, will diminish it very markedly. In my experience that, as a confirmatory test, has been of great use.

Now as to surgery. Dr. Wylder mentioned the gastro-enterostomy. Most of the ulcers in the stomach that require operation are on the lesser curvature, and I believe that if the patient is in fair condition the proper operation to do is excision and not gastroenterostomy, to which view I believe the surgeons are coming more and more. I have had that done several times and the results have been to me more satisfactory than those of gastroenterostomy, in that I am not constantly anticipating a possible interference with motility, or a vicious circle. You have that danger eliminated.

As for diagnosing only 20 per cent of gastric and duodenal ulcer cases, I think that is altogether too low. With a careful history, with physical examination, with clinical symptoms, the evidence of the string test, and the other methods we have, I think we ought to diagnose a great many more than 20 per cent by clinical methods without the aid of the X-ray.

Dr. Edward H. Skinner, Kansas City, Mo.:—When we realize that Cabot made an analysis of a thousand cases at the Massachusetts General, in which they compared the clinical diagnosis of the case with the findings later obtained at postmortem, and found that they had failed to make correct estimation of pathology in more than 50 per cent of the cases, we begin to realize that while Dr. Epler's figures seem low there is some justice to them. I think that his figures were 21 per cent—that is, X-ray findings agreed absolutely with the clinical findings in 21 per cent of the operative cases. Is that right, Dr. Epler?

Dr. Epler: No, I said that there were 21 per cent of the cases that were true to pathology; that is, the symptoms, etc., were true to pathology.

Dr. Skinner: That was not, then, X-ray findings,

Dr. Epler: No, sir.

Dr. Skinner: But the point Cabot made was the fact—and he lamented it—that in a hospital where they had every facility for examination the clinicians were wrong in more than half the cases. Again, we take the work of the Mayo Clinic. Since Carman has been up there in the X-ray department they have made quite different figures. Formerly they rated their diagnostic evidence in this wise: History first; laboratory findings second; X-ray, third. Since Carman has been working there—it is now about three or four years—they rate the history as first, X-ray findings as second, laboratory findings third. Will Mayo speaks of this in several of his papers.

The X-ray can do one of two things. It can either visualize the filling defects produced by the pathology, visualize the gastric ulcer, the duodenal ulcer, the chronic appendix; or it can determine the function of the organ, where you cannot obtain a proper filling of the duodenum. For instance you may have a spastic duodenum, maybe due to ulcer or it may be to some reflex condition as a gall-bladder or a chronic appendix or some lesion in the small intestine. If at any time during your examination with the X-ray you can visualize a normal duodenal filling, you can practically rule out a duodenal ulcer. Now in visualizing the duodenum, there are two things which are very important. The first is to use a meal of a fermented milk. The reason that Continental workers in the X-ray did not get as far as Americans have in the diagnosis of duodenal lesions and chronic appendix lesions has been that they always used a cream of wheat meal, what they call a "grease pudding," and you cannot get filling defects with a cream of wheat meal. You can estimate motility with that far better than you can with fermented milk, but you cannot get filling defects. You get practically no filling of the appendix with the cream of wheat meal.

The way we make our estimations on chronic appendix cases is in this wise: We get a filling of the appendix which shows a broken filling, an irregular filling, a kink in the appendix, and we find that this appendix does not empty along with the cecum; then we may estimate chronic appendix; or we may estimate chronic appendix from that we have found a normal stomach and normal duodenum and have tenderness over the appendix. Now that is nothing new to the clinician at all. He diagnoses it in the same way; that is the only finding he has from chronic appendix lesion—that is, tenderness on deep palpation. But when you are able to actually visualize your parts on the horizontal fluoroscope, your patient lying there on the horizontal fluoroscope, and you know where your cecum is and you know where your appendix is and you get your pain there, if you have determined the other parts normally you are ready to admit that it is undoubtedly a case of chronic appendix. There are many authorities who have brought this out very clearly. Furthermore, neither the clinician nor the X-ray man is taking a big chance in making a diagnosis of chronic appendix, because I believe they claim that 95 per cent of the people have it.

I never will forget one time when Stover, of Denver, was reporting a lot of stomach cases before the American X-ray Society in Boston in 1913, I think. He would show the plate, say, "This is a normal stomach, normal duodenum, chronic appendix." "Gastric ulcer, chronic appendix." "Duodenal ulcer, chronic appendix," etc., etc. Some one stopped him and said, "How do you make the diagnosis of chronic appendix in those cases?" And he said, "Why, you boob, don't you know that 95 per cent of the people have got that?"

It is the same way in the diagnosis of gall-bladder disease. Now there are many roentgenologists who are able to visualize the gall-stones themselves in from 40 to 50 per cent of the cases of gall-bladder disease, with the stones present. I have also found stones where they were not found surgically. Again, there are some roentgenologists who claim that they get as high as 70 per cent of their gall-bladder cases, and one man, whom we call "Ivory Soap," claims to get 94 per cent of his cases. But this man retracted slightly at the last meeting of the American X-ray Society, and he now claims that the normal gall-bladder cannot be visualized upon the plate, that whenever you get a shadow in the gall-bladder area that plunges down from the shadow of the liver area it is gall-bladder disease. When he makes a diagnosis of gall-bladder lesion under those circumstances, I tell him he has that high percentage because he is making a perfectly safe bet, just as when I find normal stomach and duodenum and appendix pretty fair and the case is suffering with periodic or non-periodic stomach attacks, with no well defined history, I will bet you ten to eight that cases running along like that have gall-bladder disease, and I won't lose.

The comfort of the X-ray examination is that you can visualize your abdominal viscera and say: "This man has a normal stomach, it empties in the normal time, there is no filling defect, there is no evidence of any adhesions, and therefore there is no pathology in the stomach.

To cite individual cases—they could be endless— there came up recently the case of a man who was sent in with the history of having had his appendix removed a year before, and they made an analysis of the symptoms, or thought that they had, and sent him in to study out the adhesions about his appendix and ascending colon. They thought that was probably the cause of his symptoms. Immediately upon the use of the bismuth and buttermilk meal we found an indurated ulcer on the lesser curvature and an ulcer in the duodenum in this case. Yet this man was complaining of trouble around his appendix, probably because he had had an appendix operation; but there was an indurated ulcer, so-called "cicatricial ulcer" in the duodenum and practically no symptoms, at least not symptoms enough to point to it from the surgeon's standpoint, and the man was a very careful surgeon who analyzes his cases very successfully.

I think that as we all become more familiar with the possibilities of the X-ray and do not look upon it as a competitor of other diagnostic methods, but as a helper and as an adjuvant, we will get a good deal farther. (Applause.)

May I make one more point? That is, in a discussion of Dr. Wylder's paper. The last part of his paper was very interesting to me. The first part of the paper did not arouse any sympathy, because as X-ray men we begin to look with a great deal of suspicion upon stomach symptoms, for we do not find that we have stereotyped symptoms for any pathology, and so we look with a good deal of suspicion upon symptoms alone. But where he spoke about the medical treatment of duodenal ulcer it was very interesting to me. That has become impressed upon me a great deal lately, because I think that the X-ray will help us immensely; if we find a stomach which is not grossly dilated where there is not a hypertrophic musculature of the stomach, where there is a small filling defect in the duodenum, in the caput, a very small filling defect with no obstruction at the pylorus, that case is going to get along very well with medical treatment. Now if we find a case of duodenal ulcer where we have cicatricial bulb and a residue at our test period with a motor meal—that is, I mean, a carbohydrate meal—why there your case will not get well under medical treatment, but demands some other method of relief, preferably a gastroenterostomy.

Dr. Epler, closing:—I am very much pleased at the discussion which this rather disconnected paper has brought out. It was the object of the paper to bring out some discussion, that we may all learn.

Now I made allowance for the case that can be diagnosed by history, physical signs and laboratory and I also called attention to the extreme case or the very irregular one, as Dr. Brown has spoken of, I claim that the irregular case is quite as essential and, many times, from the fact that it is irregular, to be diagnosed as the one that is true to type. So far as the percentages are concerned, I made the statement that there were 21 per cent that were true to type; in other words, the symptoms of 21 per cent of these cases were true to the pathology which existed as found at the time of operation. In other words, those 21 per cent could have been made as well without the X-ray diagnosis as with it.

I would like to call attention here, before I forget it, to one thing: That it is not uncommonly the case that a chronic appendix will set up a train of gastric symptoms and that those gastric symptoms will go on indefinitely over a period of weeks or months and maybe years, and that then, in the course of time, you will have practically a classic case of gastric ulcer, maybe simple, maybe indurated, and at that time when the patient comes you may be able to diagnose from the history, from the physical signs, because they may all be present, and from your laboratory findings that this patient does have, what? A gastric ulcer. If operative procedure is instituted in this particular case, you open the abdomen above, excise your ulcer, or what not, and do not get that appendix. What is the result? Will that patient be free from the symptoms he had? He at least will have the symptoms that were the beginning symptoms of his indigestive trouble.

So far, now, as the 82 per cent, are concerned, probably that part was not quite clear. In regard to the reports I received, 82 per cent of all the pathology in the abdominal cavity as diagnosed by the X-ray was correct. There was 18 per cent that was missed. For instance, a case which I had not long ago, and was diagnosed duodenal ulcer and gall-stones. He had the duodenal ulcer and he did not have any gall-stones. That is 50 per cent correct. Now do you catch the point? That is what I meant by

the 82 per cent. I might take a case of this kind which happened recently; Lane's kink near the ileocecal valve, chronic appendix, Jackson's membrane, immobile cecum, dilated. We had the Jackson's membrane, we had the immobile cecum, we had a postcecal appendix which was adherent; but we did not have any Lane's kink. Now that was my fault for making such a diagnosis, because I did not use the fluoroscope; I was too sure.

So far as the history of patients is concerned, I said in the paper that I used all the methods, and the man who attempts to make a diagnosis and does not use all of the methods is at fault, which applies just as much to the roentgenologist as it does to the clinician. In other words, a roentgenologist is a clinician and the only thing he has over the other clinician is the fact that he has an instrument whereby he can visualize certain parts of the abdomen.

Dr. Brown has spoken of the perforating ulcer not causing any symptoms. I said that they frequently do not cause symptoms until they are completely perforated and the patient stricken down unaware. I think those were my words. Now literally that may not be true, but I have known from my experience recently, in the last few years at any rate, no less than four cases that gave no symptoms. Why not? Because they were not sufficient so that the patient complained to a physician. Therefore, we were unaware of any symptoms. One of the most glaring cases of which I know was a policeman in my town. About a year ago he was on his beat at about eight o'clock at night when he was suddenly stricken down in the street. He had not consulted a physician for years. Had no trouble with his stomach so far as he knew. He was a strong, healthy man and weighed over 200 pounds and stood about six feet. He came under my service. The police sergeant first saw this man—and this, by the way, will touch on something that will come in later relative to the pain here (illustrating). The police sergeant diagnosed the trouble as acute appendicitis at the time and had him put in the hospital. I took the police sergeant's diagnosis without the history of the man. I opened him here (illustrating) and I found food contents. I opened him above and found the pathology. Therefore, we are without symptoms before the perforation happens because we do not get them. They are so trivial that the patient frequently will not call attention to them.

The question was asked as to how the X-ray finds the perforating ulcer—that was one of the slides which I did not mention—unless it gives symptomatology. Well, it so happened that in this instance the case came to me as a referred case for roentgen diagnosis, to find out what was the matter with the patient, if possible, and the only symptom in that particular case was the loss of flesh. The patient was on his feet continuously for long hours each day. The pathology had been eliminated in that particular case and the clinician who sent the case said that the only thing he could possibly suggest—I forget the blood count, hemoglobin, etc.,—was that there was possibly in this instance a carcinoma of the gut somewhere in that region that was not giving any pain or particular signs. In the process of eliminating the possible pathology of the entire alimentary tract—which consumes time in this class of cases—I found this condition.

I have been a stickler for a complete roentgenologic examination of the alimentary tract at all times. If I find evidence of a gastric ulcer, evidence of a duodenal ulcer, evidence of a gall-bladder disease, evidence of adhesions in that region, or what not, I maintain that it is just as essential to find what other pathology may exist along that alimentary tract as it is to know that, provided you have the interests of your patient at heart, because if he will submit to an operation he wants it all done at once.

In regard to treatment of gastric ulcer, of course it is a well recognized fact that gastroenterostomy is advisable, at the present day and time, when used for drainage or in those cases where the excision of the ulcer will necessarily preclude the foodstuffs from going into the duodenum where they should be.

I would not have you misunderstand my friend and colleague from Kansas City relative to the 95 per cent proposition, in other words, the way the roentgenologist diagnoses a chronic appendix. The mere fact that most people do have a chronic appendix is not the basis on which Dr. Skinner makes his diagnosis. He is more scientific than that. It is true that we make these diagnoses by a method of exclusion to a degree, but Dr. Skinner with his experience and skill and most excellent apparatus can see practically every appendix that it is at all possible to get any barium into. He can tell you also whether it is attached to the colon, in a great majority of cases, or whether the tip of it is attached downward in the pelvis, or whether it is attached to the ileum, or whether it is free and movable, or whether it empties at the time the cecum empties; and all those things by actually viewing the outlines of the opaque material in its canal. So do not misunderstand us in that instance. Thank you. (Applause).

Dr. Wylder, closing:—I have very little to add. I agree with practically everybody; I agree with Dr. Lynch that any case of duodenal ulcer that still causes any discomfort or any uneasiness should, at least, be explored, even after the medical treatment, and I think that the X-ray would form a splendid help in checking the results of medical treatment to see whether we have got as far as we should with the case. However, I have in mind three cases that I have treated medically that have been entirely free from symptoms for over a year, no symptoms whatever.

I agree also with Dr. Skinner's remarks. As I said in my paper, in any cases where there is any symptom of stenosis of the pylorus of course the only thing to do is to operate.

BACTERIN THERAPY IN BRONCHIAL ASTHMA.

BY

DR. A. D. WILSON, Prescott, Arizona

(Read before the 25th Annual Meeting of the Arizona State Medical Society, Phoenix, Arizona, April 26, 1916.)

The purpose of this paper is to bring before the Society a series of cases of Bronchial Asthma treated with autogenous vaccines.

The number of cases treated was eight, extending over a period of two years. The results were four cures, two improved, two discontinued treatments.

Bronchial Asthma has long been one of the enigmas of medicine. Treatment has usually consisted in the relief of the paroxysm and an attempt to lengthen the period between attacks.

The theoretical causes of asthma have been spasm of the bronchial muscles, swelling of the bronchial mucosa, spasm of the diaphragm, and more recently that it was a symptom of anaphylactic shock. The concensus of opinion has been that the paroxysm was due to spasm of the muscles of the smaller bronchioles.

No definite explanation had been given as to the cause of this bronchial spasm until recent years. In 1909 Metzler noted that if a guinea pig be injected subcutaneously with a small dose of horse serum, and again be given 1 cc of the same serum after an interval of at least twelve days, the animal dies within a few minutes with symptoms of respiratory failure. The lungs become greatly distended and so remain even after removal from the body after death of the animal. This pulmonary inflation has been shown by Auer and Lewis to be due to bronchostenosis of peripheral origin, which arises in consequence of tonic contraction of the bronchial muscles and can be prevented and the life of the animal saved by a previous injection of atropin.

These experiments were the first to point the way to a logical explanation of bronchial spasm as the cause of bronchial asthma.

The fact that hyper-sensitiveness to foreign proteid may be transmitted from mother to offspring in animals is a further point of resemblance, as the disposition to asthma may be inherited or acquired.

If we take for granted that the bronchial spasm is due to the action of anaphylatoxin upon the muscles of the bronchioles, we must at the same time assume that there is an underlying factor in each case, as many sensitized individuals do not develop bronchial asthma.

Kolmer believes "That no one symptom or group of symptoms can be regarded as characteristic of anaphylaxis in all animals. The various species present widely different pictures with the same protein substance,

and these differences are best explained on the ground of changes in the anatomic structure and physiologic reaction of different animals."

Schultz has shown that serum anaphylaxis is essentially a matter of hypersensitization of smooth muscles in general and that during anaphylactic shock, all smooth muscle contracts. In the guinea pig the effect is most evident in the bronchi, owing to the peculiar though normal anatomic structure of the mucosa, which is relatively thick as compared with the lumen, so that the construction of the smooth muscle throws it into folds that completely occlude the bronchi, causing death from respiratory asphyxia.

The bronchial mucosa of dogs, rabbits and rats, however, is relatively thin and poor in smooth muscle tissue, which may account for an entire absence of transitory respiratory difficulty during anaphylactic shock in these animals.

As all sensitized members of the human group do not uniformly develop asthma as a symptom of anaphylactic shock, we may assume, therefore, that sensitized individuals who develop asthma have either a bronchial lumen that is insufficient in size or a bronchial mucosa which is relatively thick.

This abnormal condition of the bronchial tubes may be an inherited stigma. I can conceive of a thickened mucosa from chronic bronchial irritation, but many asthmatics do not develop a severe chronic bronchitis until some time after the initiation of the bronchial spasms.

The logical treatment of asthma consists in discovering the source of protein absorption, removing it from the diet if it be of gastro-intestinal origin, eradicating the focus of disease, and building up the immunizing forces of the body if it be of bacterial origin.

While this conclusion may be readily stated, it unfortunately does not present as ready a solution. Our one great help in finding the offending anaphylactogen is the biologic law that all tissues of the body are to some extent sensitive to the presence of the specific protein.

This means that when a foreign protein to which the organism is sensitized is introduced beneath the skin, the tissues react at the site of injection, the resulting liberation of anaphylatoxin is absorbed and exerts its influence upon the organism.

In the case of the asthmatic where there is an underlying factor predisposing to bronchial acclusion, we get as the result of the absorption of anaphylatoxin, a typical attack of asthma if the dose be sufficient.

I have utilized this condition of hypersensitization of the skin in my attempt to discover the specific protein to which the individual is sensitized. While the list of possible anaphylactogens may contain any protein material, either of vegetable or animal origin, I have confined my tests in this series entirely to bacterial protein.

I will now state what I consider a positive reaction to a proteid to which the individual is hyper-sensitized. Upon injecting a proper sized

dose, which I will explain later, I insist that the local reaction which consists of redness, infiltration, and tenderness, shall appear within 12 hours after injection, and shall persist at least 72 hours before all signs have disappeared. The redness must be marked and extend for a space of from 7 to 12 cms. in diameter. This local reaction must be accompanied by some degree of focal reaction, centered in the bronchial tubes.

In five of the cases I was able to demonstrate a hypersensitization to certain bacteria; four of these cases responded to anti-anaphylactic treatment. One discontinued treatment.

In three cases I was unable to demonstrate to my satisfaction a positive reaction to a particular bacterial protein. In these cases treatment was unsatisfactory. The technique of preparing the bacterial emulsion was as follows. After a pains taking search for foci of infection in the mouth, nose, naso-pharynx, and lungs, a specimen was obtained, cultured as rapidly as possible, pure sub cultures made. These were sterilized at a minimum heat and put up in individual emulsions. The count was generally 500,000,000 to the cc. as I find this dilution more readily handled than the lower dilutions.

Treatment usually began with the injection of the predominating bacteria, one dose each of the series of emulsion were used before conclusions were made. The preliminary dose was always 100 million. The time between injection depended upon the skin and focal reaction. A pseudo-reaction, with slight redness, no infiltration or local symptoms, and which disappeared at the end of 48 hours, was followed by another emulsion in 48 hours.

All positive reacting emulsions were tried upon controls with the same dosage. In *no* case was I able to get a hypersensitive reaction.

This series of cases is composed entirely of men. The period of time during which they had suffered from asthma varied from three to ten years. Six cases had had from one to four operations upon the turbinates and septum without benefit.

The tendency in nearly all cases was to have periods of comfort at varying lengths of time. These periods of comfort and freedom from attacks I have invariably found to follow a severe attack attended with fever and dry, racking cough. The decrease in temperature was accompanied by an increase in sputum, which was easily raised. The history of these cases shows that at this time, except in those who had developed a severe emphysema or bronchiectasis that the relief was absolute. The patient going about perfectly comfortable.

Case 1, H. L., age 43, German; occupation, machinist. Family history, negative. No history of asthma in parents, brothers or sisters.

Past History: Has been subject to more or less cough as long as he can remember, usually aggravated in the winter time.

First attack of asthma began in fall of 1910. Was not very severe and did not cause him to stop work.

Since then the attacks have been more numerous, and of greater severity. At the present time spends most of each night sitting up in bed and walking around. Has had periods of freedom from attack lasting as long as a week. During these times he felt perfectly well and strong. Raises a large quantity of sputum. Sputum is generally scanty and tenacious before attacks. Finds that when he can clean his lungs out thoroughly attacks tend to subside. Has used asthma powders and cocaine spray for a long time with varying amount of relief.

Examination: Shows a fairly well developed man, weight 138 lbs., height 5 ft. 10 ins. Skin and mucosa pale. Mouth: Teeth in fair shape, no pyorrhea, no loose teeth. Pharynx, slight chronic hyperemia of mucosa. Nose breathing clear. Septum shows old puncture. Turbinates slightly enlarged.

Chest: Examination of chest shows a chronic fibroid tuberculosis of both apices. Lower left lung retracted, from base to fifth rib breath sounds very faint. Evidently old tuberculous pleurisy.

Moist rales are heard everywhere over chest, more especially at base. Eight hours since last attack of asthma. Quantity of sputum in 24 hours 8 ounces by weight.

Examination of sputum: No T. B. Gram. Negative diplococcus, member of micrococcus catarrhalis group. Strep. Equinna, Gram Positive Diplococcus, which is evidently strep. mucosus, Micrococcus, Tetragenous and bacillus Influenza. All bacteria except the bacillus Influenza gave pseudo reactions.

The first injection of Influenza bacilli gave a marked location reaction, beginning within three hours. The following morning, areola 12 cm. in diameter and very tender and swollen. The asthma was much as usual during the night, but much more intense during the day time. The second night asthma was very severe and continued throughout the night.

Third night morphine one-fourth gr., atropin one-fiftieth gr. was given at 8 p. m. Patient passed better night. At the end of 72 hours the local reaction had faded to a slight stain. No tenderness or swelling.

On the fourth day asthma much improved. At night patient stated that his breathing was as free as if he had been given an injection of adrenalin, of which he had had previous experiences.

Improvement lasted up to the sixth day. Injection of 50 million on eve of the sixth day marked local reaction coming on quickly and lasting till third day. Exacerbation of asthma after injection, followed by relief.

This patient was under treatment for five and a half months. Total number of injections given 22. Range of doses from 25 million to one billion, given at intervals of from five to seven days. The asthmatic attacks decreased in intensity after the second week. Up to the third month patient had intermittent spells of complete relief and bronchial attacks of varying intensity. Morphine one-fourth gr. and atropin one-fiftieth gr. were given the evening of each injection.

At the end of the third month sputum for 24 hours was from one to one and one-half ounces by weight. General condition improved, increase in weight 12 pounds.

During the last two months of treatment patient had no attacks during the day time. Occasional slight attacks at night, lasting from ten to fifteen minutes. The last month of the treatment was free from spasms of any kind. Was under observation for one month after the cessation of treatment, with no attack of asthma.

The last injections contained as high as one billion influenza bacilli. The local reaction was very slight. The focal reaction for some time before discharge could not be noticed.

Follow up history. November 9, 1915, eight months after discharge, patient writes that he has been back at work since discharge. Has had no attacks of asthma. Some slight dyspnea on exertion. Otherwise feels perfectly normal.

The following case histories will be given in abbreviated form.

Case No. 3, J. W., age 32, American, farmer. Has had asthma for four years.

Family History: Mother was asthmatic. Five years ago was operated on for frontal sinusitis, supra orbital route. Sick for three weeks. Has noticed certain amount of discharge from nose at various intervals, which he has laid to cold in the head. Has had considerable cough lately, consisting mostly of bronchial slime.

Bacteriological examination of nasal secretion obtained after thorough cleansing of nasal cavity contained a practically free culture of strep. viridin. Upon injection of 100 million of an emulsion of this cocci, a very positive local reaction was obtained, accompanied by increase in bronchial spasm, and later by some supra-orbital pain over diseased sinus.

The treatment of this case was a prolonged one, extending over a period of eleven months. The nasal discharge was influenced from the beginning, but tended to relapse. At the end of the treatment there was still an occasional day when discharge was noticed.

The dosage in this case ranged from 25 million to four billion. The asthmatic attacks moderated in intensity after the first few weeks. Later there were periods of absence of attack, lasting as long as three weeks. Before discharge the patient had been free from asthma for over a month. This patient has not been heard from since.

Case No. 4, L. B., age 45, American, lawyer. Family History: Negative.

Past History: Six years ago had severe attack of pneumonia, made good recovery but has had trouble with left ear since the attack. Has never regained full hearing in ear. Sometimes entirely deaf in left side. Ear drum has ruptured two or three times. Asthma for four years. More severe during the last year. Has considerable cough. Has had periods of

relief, sometimes as long as a month. Does not know whether the periods of relief were coincident to ruptured drum.

Bacteriological examination: Culture made under aseptic precautions from naso-pharynx on left side in region of eustachian tube. First emulsions consisting of usual throat flora gave negative results.

Second examination: Pneumococcus found in predominating numbers. Positive reaction from 100 million. All reaction in this case was followed by increased deafness in the left ear. Treatment over a period of six months resulting in curing asthma. Ear condition improved, but not normal.

Case No. 6, R. T., age 55, English, broker. Family history: Father and one brother asthmatic. Past history: Has had chronic bronchitis for many years. Had asthmatic attacks when a child. Present illness dates back ten years. Sputum thick and purulent. Large amount.

Examination shows typical emphysematous chest. Bronchiectasis of both right and left secondary division of bronchi. Heart enlarged.

In this case a non-identified gram positive cocci was constantly found in preponderance. Upon injection, a decidedly marked reaction was obtained, resulting in great discomfort.

Dosage was started at five million and gradually worked up. For a long time any attempt at increased dosage was followed by intense distress. Maximum dose in this case 200 million. At the end of nine months, the typical bronchial spasms were ended. Marked dyspnea on exertion was constant. Sputum still large quantity. While the patient made at least a temporary cure, I expect to see the asthma recur.

The two absolute failures were cases of long standing with profuse expectoration and marked bronchitis. After several attempts to obtain emulsion that would give positive hypersensitive reaction, the patient tired and gave it up.

Conclusions.

Animal experimentation has proven that bronchial spasm is a constant feature of anaphylactic shock in certain animals.

Clinical experience has shown that in persons suffering from asthma the condition can be greatly aggravated by coming in contact with the offending proteid, or by having the specific protein introduced into the body either through the gastro-intestinal tract or by inoculation.

Persons suffering from Hoarse Asthma have been helped or cured by immunizing doses of Diphtheria antitoxin. The modus operandi of dehypersensitization is still obscure. It would seem as though the process consisted in either destroying or delaying the formation of specific amboceptors which in conjunction with non-specific compliment disrupt the protein anaphylotogen with liberation of anaphylatoxin, or the stimulation of anti-bodies which have the power to further digest or neutralize anaphylatoxin, rendering it innocuous.

A PLEA FOR A MORE INTELLIGENT INTEREST IN TUBERCULOSIS ON THE PART OF THE MEDICAL PROFESSION.

BY

F.H. McKEON, M. D., Surgeon, U. S. Public Health Service, Fort Stanton, N. M.

(Read before the 3rd Annual Meeting of the Medical and Surgical Association of the Southwest, El Paso, Texas, December, 1916.)

It may appear to many that a plea for a greater interest in tuberculosis at this time is a work of supererogation. It could be urged, and truthfully so, that more thought is being given to the tuberculosis problem, not only by physicians but by the laity, than ever before. The numerous municipal, state and national associations for the prevention and cure of the disease and the sanatoria located in every state of the Union might well be adduced as evidences of widespread interest. But while admitting these facts and having the greatest admiration for the work that has been done and is being done, the writer maintains that there is a need for a more intelligent interest in tuberculosis on the part of the medical profession. This conclusion has been reached after nearly four years' service at the sanatorium of the United States Public Health Service, during which time there has been ample opportunity not only to examine the work of his brother officers but to observe the activities of many physicians practicing in the Southwest.

Many tuberculosis workers, among them the best, are abandoning the clinical side, which includes not only the treatment of a tuberculous person but also the teaching him to take such intelligent care of himself that he will not be a menace to the non-infected, for the broader and more important field of work which has as its object the ultimate eradication of the disease. This is as it should be for if we are to rid the human race of this, the greatest scourge ever inflicted upon it, we must push our battle line forward, and not be content with merely holding our trenches and caring for our wounded as we have done in the past. That we have still much to learn concerning the means of transmission of the disease and the manner in which immunity to it is gained, is conceded by all investigators. But little by little we are adding to our knowledge and although the time is very far distant indeed when it will be said that tuberculosis is conquered, there can be no doubt that a time is surely coming when it will cease to exist as a manifest disease. It may be that the solution will be found in regular periodic physical examination of all persons by properly qualified physicians, thus detecting the disease in all cases in its very infancy, and having learned of its presence taking such steps as will insure not only the recovery of the threatened one but the protection of those about him. Or it may happen that a biologic product will be elaborated that will confer

active immunity, especially to children, as is now done in smallpox and typhoid fever. Bushnell[1] suggests that the absolute isolation of all children from tuberculous adults, since practically all tuberculosis is contracted during childhood, will result in the ultimate disappearance of the disease as an entity. The tubercle bacillus, he avers, will always be with us but only as a benign immunizing agent. This plan, however, would have to be secondary to the periodic physical examination of all persons, urged by Smith[2], since it would be necessary to know the adults who would be dangerous to children. There are large numbers of cases of open tuberculosis with symptoms so mild as to never attract the attention of the infected one or those about him. And if, as frequently happens, there is a sufficient amount of antibodies formed to heal the lesion before much tissue destruction occurs the "carrier" never knows that he had the disease. It is this type of case that is particularly dangerous to children. There are those who tell us that in time racial immunity will be established and the disease thus held in check. They point to the comparative infrequency of phthisis amongst the Jews, the oldest of civilized races, and to the hypersusceptibility of the Indian, the youngest member of civilization, as proofs of the argument. And given sufficient time and isolation from all other peoples, a race might attain a high degree of relative immunity. But the length of time needed would be too great and the world is so constituted today that it is impossible to prevent intermingling of the less immune with the more immune races.

However, these speculations as to what the ultimate solution of the tuberculosis problem will be, interesting as they are, have only an indirect bearing on the task that confronts those who are fighting to prevent the spread of the disease in the present. And in the last analysis it is the general practictioner who can do the most along this line. It is he who first sees the patient when the latter is impelled to seek medical advice by reason of vague symptoms, often not referred to the thorax, which should indicate to the physician the need of a careful and thorough examination of the lungs. Too often a patient complaining of indigestion, or malaise, or a slight cough, is given a prescription intended to control the symptom and told not to worry. The relief experienced from the digestant, cough mixture or tonic lulls the patient into a feeling of security and allows the disease to continue its insidious attack. When the diagnosis is finally made, the case is too often found to be a far advanced one. Even then it is in rare instances that the physician has sufficient conception of the nature and extent of the lesion to properly advise his patient. The vague advice to "go West" is not sufficient. The once almost universal idea that certain climates have a specific action in healing tuberculous lesions is being abandoned. And while it is not within the province of this paper to discuss the effect of climate in tuberculosis, I cannot refrain from the statement that the role it plays would seem to be a comparatively unimportant one.

In a recent article, Ford[3] undertook a study of one thousand cases that had been admitted to the Gaylord Farm Sanatorium between Oct., 1907, and January, 1915, in order to see just what was being done by the family doctor in his efforts to diagnose pulmonary tuberculosis correctly. His article deals rather with the neglect of the physician to utilize the diagnostic means at his disposal than with correct diagnosis, but it is so near the point that I am trying to make that his summary is given herewith:

"These consulted nineteen hundred and forty physicians of whom 1,085, or 55.1 per cent., made a physical examination only, and of this number, 151 did not deem it worth while to have the patient strip; 13, or .7 per cent. took temperature only; 14, or .7 per cent., made a sputum examination only; 381, or 20 per cent., made a chest and sputum examination; 114, or 6 per cent., examined the chest, took temperature, but did not make a sputum examination; 3, or .02 per cent., took temperature and made a sputum examination, but no physical examination; 133, or 7 per cent., made a chest examination, took temperature and examined sputum; 197, or 10.2 per cent., made no examination of any kind."

In other words, only seven per cent. of nineteen hundred and forty practicing physicians gave evidence of sufficient knowledge of clinical tuberculosis to realize that no one can arrive at an intelligent opinion as to the presence or absence of the disease without utilizing the stethoscope, the thermometer and the microscope. Of course, I am speaking now of the class of cases that have not advanced to the hopeless stage. It does not require much diagnostic acumen to pronounce the far advanced consumptive, with his emaciation, lagging gait, harassing cough and copious expectoration, to be tuberculous. While it is not given to every one to have sufficient skill in percussion and auscultation to detect an early lesion, although I believe that the great majority of educated physicians can be taught to do so, all of us are or should be able to properly interpret temperature findings; and what is more important should have a lively sense of the large part that the thermometer plays, when correctly used, in the diagnosis of tuberculosis. Very frequently an accurate temperature record kept for a period of three weeks to a month will enable one to diagnosticate the disease even before the most expert can find physical signs.

Another mistake pointed out by Ford is the failure of the practitioner to realize that the spitting up of blood usually means tuberculosis. Smith[4] found that out of a total of 1,210 cases of pulmonary tuberculosis admitted to the United States Marine Hospital (now Public Health) Sanatorium, at Fort Stanton, New Mexico, 354, or approximately 21 per cent., gave a history of having had one or more hemorrhages before arrival. The relative frequency of hemorrhage before admission, since I have been stationed at the sanatorium, is about the same as it was then. In taking anamneses at the time of the first examination, I have been particularly struck with the number of men who stated that they spat blood one, two or more years previous and had sought medical advice only to be told that the symptom meant nothing more than "throat trouble," or something equally vague, and need cause no alarm. Very rarely was an examination of the chest made. Now, as Ford well says, there may be some excuse for a

man who carefully examines his case but makes a wrong diagnosis, but there is absolutely no excuse for the man who takes neither time nor trouble to go over his patient.

Passing from the men who fail to utilize the means at their disposal to make a diagnosis to those who do, what do we find? Perhaps not such a deplorable state of affairs, since, as has already been said, there is some excuse for the man who attempts to make a correct diagnosis and fails, but certainly a most lamentable one. The admissions to Fort Stanton from July 1, 1913, to January 31, 1915, (this period is chosen because of the writer's personal knowledge of conditions during the time) numbered 414. Of these, 376 were transferred from various United States Marine Hospitals, the remaining 38 being readmissions who came back by authority of the Surgeon General without having applied at a marine hospital for relief. When a diagnosis of tuberculosis is made in a patient at a marine hospital, the officer in charge requests authority from Washington to transfer the patient to Fort Stanton if in his judgment the man is able to travel and is a suitable case for sanatorium treatment. When the request is made a copy of the patient's clinical record, including the physical findings, is sent with it to Washington. The record is subsequently sent to Fort Stanton. In this way the officers at the sanatorium are enabled to compare their findings with those of the transferring station. Original examinations at Fort Stanton were made at the time this was written, by the commanding officer, Surgeon F. C. Smith, U. S. P. H. S., assisted by the writer. Dr. Smith is a recognized authority on pulmonary tuberculosis whose judgment as to the nature and extent of a lung lesion would be accepted as correct by practically all phthisiologists in this country. Hence, I feel justified in making the findings at Fort Stanton the standard so far as the United States Public Health Service is concerned.

Out of the 376 admissions referred to above, less than 2 per cent. had been correctly diagnosed at the transferring station as to the nature and extent of the lesion. I have reason to believe that similar conclusions would be drawn if inspections were made of the records of the other two government sanatoria. In considering these statements, it is to be borne in mind that the transferring officers are for the most part commissioned officers of a government medical corps; that they are commissioned only after passing a rigid examination, the standard of which is considerably higher than that maintained by any state examining board; that in order to be considered for commissions they must be graduates of high-grade medical schools and have presented satisfactory evidence of liberal pre-medical education; and that their service experience has afforded them opportunities to become skillful clinicians or sanitarians. If these highly trained men are not competent to properly elicit and to correctly interpret the physical signs of phthisis, what can be expected of the ordinary practitioner? The latter is frequently a man of only ordinary medical training whose opportunities to add to his store of knowledge are limited. If

he does find time to visit a medical centre he is attracted to the clinics of the skillful surgeon or the brilliant internist rather than to the clinic where correct methods of early diagnosis in tuberculosis are taught. His experience leads him to believe that a person with the disease is doomed and, since he rarely makes a diagnosis until the process is far advanced, he is correct in his belief. He cannot be interested in a disease that apparently offers no opportunity for cure.

It is self-evident that one cannot be interested in a subject unless he has knowledge of it; and the great majority of the medical profession has only a vague general knowledge of tuberculosis. The blame lies not with the practicing physician, however, but with his teachers. The general early diagnosis of phthisis will not be possible until every medical school gives the subject the prominence it deserves. How this may be done will be discussed later. Much may be learned however from a study of the numerous excellent text-books on the subject and it would seem that every physician who may be called upon to diagnosticate and advise in a case of pulmonary tuberculosis should realize the importance of familiarizing himself with at least one of these works. After examining several hundred case histories written by men who transfer patients to the sanatorium at which I am serving, I cannot escape the conviction that the average physician is ill-advised as to the fundamentals of the pathologic processes of phthisis. It cannot be said of this phase of the subject as was said of diagnosis that due importance is not given it in the schools. Practically all graduates in medicine have received adequate instruction in the pathologic anatomy of tuberculosis, but very few of them seem to retain any considerable portion of it. And since no intelligent conception of the meaning of physical findings can be had without a knowledge of the underlying pathology, a return to the text-books would seem to be indicated. And it should not only be known that there are stages of infiltration, of consolidation, of tissue destruction and of connective tissue proliferation, but that these processes may be of varying ages and degrees of activity and when properly interpreted strongly influence the prognosis and treatment. And it may not be amiss to here briefly review the symptoms and the general management of the three commonly accepted stages of the disease.

The Early Case.

Incipient tuberculosis of the lung consists of an infiltration of one or both apices or of a small portion of one lobe, without destruction of tissue, marked constitutional symptoms or serious complication. Early tuberculosis may manifest itself in many different ways. There may be only a disinclination toward physical or mental effort or a complaint on the part of the patient that he tires easily; there may be only loss of appetite with corresponding falling off in weight; indigestion may be the only symptom complained of. If patients are carefully and persistently questioned however the statement will be elicited in practically all cases that there is or has

been a slight cough or "clearing of the throat" which may or may not be accompanied by expectoration. In those cases in which hemorrhage, small or large, is the first symptom noticed, a history of previous slight cough can generally be obtained if the patient is observant. Accompanying any of these symptoms there will usually be found a slight afternoon rise of temperature and a quickened pulse rate. It is at this time that a careful examination of the chest and sputum will often reveal incipient disease, and a failure to make such examination constitutes culpability on the part of the physician consulted. What shall the chest examination consist of? In the hands of the expert, palpation and percussion will play an important part, but the man who has not been trained to detect the delicate shades of difference in pulmonary vibration and resonance that accompany beginning infiltration will do well to place his main reliance upon the auscultatory findings. He should listen not only to natural breathing, which may tell him nothing, but especially "to the natural inspiration following slight but evident cough." By following this method any man who is accustomed to the use of the stethoscope will by dint of practice be able to detect even the finest rale. But it is to be remembered that rales have different significations according as they are moist or dry, coarse or medium, fine or crackling in nature and in order to intelligently direct his patient's treatment the physician must have a full understanding of this fact. To quote Smith[2]:

> "The ordinary practitioner must be prepared to distinguish between the different type of early disease and advise accordingly. One may need perhaps only a few months' rest, or a modification of certain habits of work or play, the abandonment of vicious habits or inordinate amusements, and the adoption of more hygienic practices relative to ventilation, etc. For another, even with early incipient disease, may be required absolute and immediate rest and a ruthless suppression of the most cherished habits and most ardent desires of the individual."

It is rare that an incipient case cannot be cured without sanatorium treatment providing that the patient is in even ordinary surrroundings. Rest, either partial or complete, preferably in the open air but at any rate in a well ventilated room, a sufficiency of good nourishing food, (which need not necessarily consist largely of milk and eggs) and avoidance of worry will accomplish the result as surely at home as at an institution. The thermometer should be the guide to the degree of rest needed. So long as there is even the slightest rise of tempertaure the patient should be confined to bed. In afebrile cases, ten hours' rest at night and two or three during the day will ordinarily suffice. If the patient can well afford it and wishes treatment at a sanatorium in any of the climates that are generally supposed to have a peculiarly beneficial effect in tuberculous disease, he will of course be allowed to go. And those who for any reason are unable or unwilling to follow the regimen at home should, whenever possible, be sent to an institution. The training that a tuberculous patient gets at a sanatorium is very valuable both to himself and to those about him.

The Moderately Advanced Case.

Moderate tuberculous involvement of the lung is usually taken to mean an infiltration or partial consolidation of not more than two lobes without cavitation or serious complication. The clinical symptoms in this class may be mild, although always more pronounced than those seen in incipient cases. There is usually cough and expectoration, periods of moderate pyrexia and a tendency to tire easily; the appetite fails and there is moderate loss of weight. Inspection may show inequality of the respiratory excursion, palpation some increase of vocal fremitus and percussion impairment of resonance. But, here again, the occasional examiner will do well to depend largely upon the stethoscope. There may be weakened breath sounds over the area involvement; bronchovesicular breathing may be but rarely is met with in the degree of consolidation present in moderately advanced cases; but rales are always present and will always be heard if the auscultatory cough is employed. It is important in this as in the far advanced stage to determine the degree of activity. This may be done by considering the severity of the cough, the amount expectorated, the presence or absence of fever and the amount of moisture present. Bonney (5) emphasizes the statement that "the degree of activity may be measured to a great extent by the amount of moisture in the bronchial tubes." The management of a moderately advanced case will depend largely upon the degree of activity and the age of the patient. A young or middle-aged person displaying signs of even moderate activity should be sent to a sanatorium whenever possible. The length of time that sanatorium treatment will be necessary can never be predicted with certainty, since in tuberculosis as in other infections the patient and not the disease must be treated. In patients above the age of forty or forty-five with evidences of long standing disease and only slight activity, a modification of the mode of living, habits, etc., as outlined in the management of incipient cases, will usually suffice.

The Far Advanced Case.

This class takes in all cases not included in the two previous groups. The classification of far advanced tuberculosis from a standpoint of amount of involvement is taken to mean that the patient so classified has disease in more than two lobes or disease in one or two lobes with cavity formation or a serious complication. The clinical manifestations of the stage are many and varied. While some individuals may present every appearance of robustness, in the great majority of cases the general appearance of the patient is highly suggestive of the disease.

"Emaciation, pallor, dyspnoea and cyanosis are often pronounced. The skin of the body may be dry, harsh or even scaly, and the hands thin, cold and clammy. The fingers may be elongated with tapering extremities and incurving nails or the ends distinctly clubbed. The neck is thin and appears unduly long. The ears stand out prominently from the sides of the head and are often waxy, bloodless and almost transparent. The breathing is at times labored, with the action of the accessory

muscles of respiration prominently displayed. The nose may be pinched, the eyes sharp and bright, the hair dry and lustreless, and the face pallid, cyanotic or flushed. The complexion is sometimes remarkably pale and clear exhibiting strikingly a delicate plexus of superficial veins. The patient frequently assumes a pronounced stooping posture, the general attitude being that of marked debility." (Bonney, 5.)

While this is the picture that will sooner or later be presented by nearly all cases of far advanced phthisis, it is to be remembered that between it and an appearance of health and vigor there are many degrees. Dependent upon the amount of relative immunity possessed by the individual and treatment, it may take a considerable time for a patient to take on an appearance in which a glance is sufficient to make the diagnosis. In those cases in which marked fibrosis exists, the duration is much longer and patients so afflicted may live an astonishingly long time despite emaciation and respiratory incapacity. The physical signs of this stage depend upon the pathologic changes that have taken place in the lungs. Areas of infiltration will produce impairment or resonance and rales, the latter differing in character according to the amount of moisture present. Over consolidation will be found dullness, increased vocal fremitus, bronchial or bronchovesicular breathing, bronchophony and rales. Cavity formation may manifest itself by tympanitic, amphoric or cracked-pot resonance in percussion, but the surest way to detect a cavity is by auscultation which will elicit pectoriloquy or egophony and cavernous or amphoric breathing and gurgling cavernous rales. Fibrosis may give the signs of infiltration, consolidation or cavity formation or all three, but the distinctive signs of the process are weakened breath sounds and dry clicking or crackling rales. The intensity of the breath sounds may be diminished in any far advanced case of tuberculosis and a cavity may exist without always giving physical signs. The latter fact is explained by the plugging of the tubes or by the filling of the cavity itself with purulent secretion. Complications may be met with in any stage of the disease, but are oftenest seen in advanced cases. The most common tuberculous complications are tuberculosis of the larynx, pleurisy, empyema, genito-urinary tuberculosis, tuberculosis of the peritoneum, tuberculosis of bones and joints, and glandular tuberculosis. Syphilis is prominent as a non-tuberculous complication and the two diseases frequently coexist.

What shall we do for the far advanced consumptive? Certainly we should put him in an environment that will effect an arrestment of his disease if that be possible; prolong his life and earning capacity if we may; but in all cases make him as comfortable as may be and keep him from being a menace to others, especially to children. Sanatorium or hospital treatment will accomplish these desiderata in most cases and the nearer the sanatorium is to the patient's home the better it will be for all concerned. The patient without complete involvement of both lungs or serious complications, a reasonable degree of robustness and only moderate clinical symptoms, may with profit be transferred to a different climate if he be a person of sufficient means or a government beneficiary. But to send

a patient with nearly complete involvement of both lungs, marked emaciation, daily fever, rapid pulse, distressing cough and copious expectoration, several thousand miles to a higher altitude is not only a waste of time and money but is criminal cruelty. Segregation of such cases is undoubtedly desirable, but it need not necessarily be done in an institution exclusively for the tuberculous. This statement holds good for the fibroid case as well. In this type, dyspnoea is always severe and since, as has already been stated, the life of a fibroid patient may be prolonged for a considerable number of years, it is of the first importance that he be where the act of breathing will be easiest for him. In other words, he should be at or near the sea level. Men above the age of fifty-five years with clicking rales in their chests and tubercle bacilli in their sputa should not be sent to a distant sanatorium.

Most of the complications can be treated equally successfully anywhere and some of them should be kept away from high altitudes. As has been stated, syphilis frequently accompanies tuberculosis and a Wassermann test should be made in all cases of phthisis where there is reason to suspect a luetic taint. Treatment with neosalvarsan followed by a course of mercury, and in selected cases potassium iodid, will often result in a marked alleviation of all symptoms.

It is not intended that the above should be considered other than as the barest outline of the symptoms and management of tuberculosis. On such a vast subject it would be impossible in a paper of this length to do more than stimulate thought. Much of what has been said is elemental and all has been better said many times before. Volumes have been written upon the importance of early diagnosis in tuberculosis, but since it is evident that only a small proportion of general practitioners have been reached, or at any rate impressed, by the voluminous literature, we must keep on iterating and reiterating that early diagnosis means cure and probably the eventual eradication of the disease.

The ability to detect early lesions is important to those of us who make examinations for enlistment for another reason: namely, the keeping down of the number of non-effectives and of additions to the pension rolls. A large percentage of enlisted men who break down with tuberculosis during their first two years of service probably had a demonstrable lesion, active or inactive, at the time of enlistment. The same statement might truthfully be made of those persons who became manifestly tuberculous within two years of the time that they have been examined and passed for life insurance.

Reference was made previously to the need of more thorough instruction in the diagnosis, especially early diagnosis, of tuberculosis in the medical schools. When it is recalled that even now after years of hard and persistent fighting against it, the disease kills more than 140,000 persons annually in the United States alone and still stands first on the list of

mortality tables it would seem that no such need should exist.* However it is a fact that comparatively few American schools are properly equipped to teach phthisio-diagnosis and therapy. This omission in the medical curriculum should be remedied by requiring every "acceptable" medical school to have a clinical chair of medical tuberculosis. The chairs should of course be filled by men well qualified to teach the subject.

As has been indicated earlier in the article, the graduate in medicine can learn a great deal about the subject by frequently consulting the books that have been written on it. He should of course avail himself of post-graduate instruction whenever that is possible. He may never become a clinical expert in the diagnosis of tuberculosis, but he can learn to recognize the danger signals of the disease and refer his patients to a specialist before irreparable harm is done. Government medical officers should, upon being commissioned, be sent to the sanatoria of their respective Services for a course of instruction. When they have all been taught to recognize the early manifestations of tuberculosis and what class of cases are suitable for sanatorium treatment, the government will be saved a considerable sum of money annually.

In conclusion, let it be said that the eradication of tuberculosis is peculiarly a problem of the physician. Social workers and philanthropic laymen can do much by improving social conditions and alleviating poverty, but the disease will never cease to exist until the entire medical profession has an intelligent grasp of the whole nature of tuberculosis and a keen appreciation of the importance of early diagnosis.

REFERENCES.

(1). Bushnell, G. E.—Relation of Immunity to Infection in the Tuberculosis of the Adult. Transactions, Medical and Surgical Association of the Southwest, 1914.

(2). Smith, F. C.—The Eradication of Tuberculosis and the Means by which it may be accomplished. Texas State Medical Journal, January, 1915.

(3). Ford, J. S.—Does the general practitioner utilize the means at his disposal for the diagnosis of early pulmonary tuberculosis? Medical Record (New York), September 18, 1915.

(4). Smith, F. C.—Hemoptysis in Pulmonary Tuberculosis. Transactions, National Association for the Study and Prevention of Tuberculosis, Fourth Annual Meeting.

(5). Bonney, S. G.—Pulmonary Tuberculosis and Its Complications. W. B. Saunders & Co., Philadelphia.

*Since this statement was written, tuberculosis has fallen to second place on the list of mortality tables. (The author.)

THE X-RAY DIAGNOSIS OF FOCAL INFECTIONS ABOUT THE HEAD.

BY

W. WARNER WATKINS, Pathological Laboratory, Phoenix, Ariz.

Some writer, who evidently reads current medical literature, has made the sarcastic comment that we are coming to regard all disease as due either to metastatic infection or to acidosis. This may be a just criticism of a tendency to over-enthusiasm on these subjects, but in a given diseased condition, we have never completed our search for the causes of pathological processes, until these two factors have been eliminated.

In spite of voluminous literature on the subject of the dominant importance of focal infection in chronic disease, it has not yet received the attention which it deserves from the medical profession. For fifteen years, Murphy taught that whenever you have an acute chronic arthritis, you can always find a localized pus pocket elsewhere in the body, meaning that an arthritis is always metastatic. Further, of what is of more vital interest to the general practitioner, the joint disease cannot be cured until the original focus is located and eradicated. This teaching of the Master Surgeon is no longer disputed, although frequently forgotten when the physician is called on to treat an arthritis.

Focal infections can be located anywhere in the body or on its surface; furuncles, gonorrheal pockets in prostates, seminal vesicles, tubes or ovaries, pus pockets in glands, chest, abdomen, extremities, or along the gastro-intestinal tract. But tonight, our remarks will be confined to those foci located about the face, i. e., in the alveolar processes or in the accessory sinuses of the head. The conditions which may, and frequently do, arise by metastasis of organisms from such foci are, arthitis, endocarditis, nephritis, neuritis, myositis, stomach or duodenal ulcer, gall-bladder infection, appendicitis, metastatic abscesses, besides conditions designated by such vague terms as anemia, neurasthenia, neuralgia, chronic headache, etc. This sounds like a formidable list, but the authorities from whom the list is quoted are just as formidable:

C. Burns Craig says: "Purulent processes in the posterior urethra, vagina or tonsil are considered ample explanation for any arthritis, neuritis or endocarditis which may subsequently develop. Why, then, do we pay so little attention to focal infections around the teeth, when we know that these foci harbor that most dangerous group of metastatic organisms, the streptococci." (JAMA, 12-5-14.)

Dr. Billings says: "Alveolar focal infection may be the dominant factor in the production of a systemic disease, of which endocarditis, chronic arthritis and myositis are examples."

Dr. C. H. Mayo says: "The great importance of the well-known diseases of the nasal passages, with their sinuses, the lymphoid tissues of the pharynx and the diseases of the gums and teeth is now generally appreciated. In chronic and recurrent

diseases a search must be made to establish the non-participation of each of the several sources of infection."

Moody, giving the figures from Billings Clinic, says that 332 patients with chronic arthritis were given careful X-Ray examination of the teeth and 89 per cent. of them were found to have chronic alveolar abscesses. (JAMA, 9-16-16.)

Elshnig (JAMA, 10-17-14) says that out of 208 cases of disease of the optic nerve, 35 or 15 per cent. were due directly to disease of the nasal accessory sinuses.

Rosenow says: "My studies on the members of the streptococcus group make it likely that it is in the focus of infection that changes in virulence occur. In other words, the focus of infection is to be looked on not only as the place of entrance of the bacteria, but also the place where the organisms acquire the peculiar property necessary to infect. These foci are so common in patients suffering from arthritis, neuritis, appendicitis, ulcer of the stomach, cholecystitis, goitre, etc., and so rare in individuals who have had superb health for years that their direct etiological role can scarcely be questioned."

Dr. Rosenow's work has demonstrated to the satisfaction of himself and many critical observers that certain strains of streptococci have an elective virulence for certain tissues and localities. For example, a certain strain of streptococcus will cause ulcer of the gastro-intestinal mucous membrane when they metastasize. Moody established this experimentally by isolating this specific strain of streptococci from alveolar abscesses and injecting them into rabbits where they almost invariably produced hemorrhage into the stomach and, usually, ulcer. So, the careful internist, if he places any credence in Rosenow's work, must locate and eradicate all such pus foci from his ulcer patients, as part of the routine medical or surgical treatment. More recent studies of Rosenow and his co-laborers, have illumined the subject of the bacteriology of alveolar and sinus infections to an astonishing degree. The cultivation of streptococci under partial oxygen tension has revealed that they change their cultural, morphologic and pathogenic characteristics according to the oxygen tension under which they grow. They will develop at all tensions from atmospheric to complete absence of oxygen, but their elective virulence will depend on the tension under which they were forced to develop. By planting a pure strain of streptococci in long test tubes, colonies of varying virulence and different tissue affinity can be picked off at different depths in the tube, those nearest the top where oxygen is plentiful having characteristics entirely different from those near the bottom where oxygen supply is poor. It can easily be seen that an alveolar abscess without exit, will develop an anaerobic organism with a particular virulence; when the abscess ruptures and a little oxygen gains access, the organism will change its cultural characteristics and likewise its elective virulence; if the tooth is extracted and free access of oxygen allowed, provided the organisms are not destroyed in some manner, we will have still a third strain of streptococci with characteristics different from both of the others. The necessarily close relationship between the X-Ray findings and the bacteriological laboratory should begin to become apparent.

Although, as far back as 1881, the dentists were warning the medical profession of the dangers of infected teeth, and have continued to do so from that day to this, it was not until 1910 that William Hunter, of London,

pointed out the relationship between septic teeth and systemic disease. About the same time the roentgenologists (headed by Pfahler in 1909), entered the field with their plea for the use of the X-Ray as a means of accurately diagnosing the conditions around the teeth. Since that time, numerous articles have appeared, an enormous amount of experimental work has been done, and the relationship between suppurative processes about the face and a host of systemic disorders has been established beyond the possibility of contradiction.

The sinuses of the face, maxillary, ethmoids, frontals and sphenoids and abscesses around the teeth, whether communicating with the mouth through a sinus, or not, furnish the necessary conditions for the development of virulent organisms, as stated by Rosenow; these conditions are (1) seclusion from bactericidal agents, and (2) partial oxygen tension.

With these preliminary remarks, as a foundation, this paper presents three propositions:

First: It is necessary to locate these foci of disease, and, in searching for them, the aid of the Roentgen-pathologist is essential.

Second: It is necessary to correlate the X-Ray and other laboratory findings in order to determine the gravity of the pathology found.

Third: The three-cornered relation between physician, his patient, and that patient's dentist is of vital importance, and is far too frequently on an absolutely wrong basis.

First: The routine employment of the Roentgen Ray is absolutely essential. It is not a thing which is "nice to have," and "of value in some cases." The X-Ray is absolutely necessary. Dr. Billings says: "The X-Ray film should be used because by no other method can one know the condition of the alveolus and the roots of the teeth." Dr. Moody offers the comforting statement that "if the X-Ray film is properly made, it is absolutely pathognomonic, provided it is correctly interpreted." Visual inspection, transillumination, instrumental examination, tapping the teeth with a hammer or touching them with ice, are all inadequate to reveal the pathology around the teeth or in the accessory sinuses, altho any one of these methods will sometimes suffice. The nerve pulp of a tooth may be dead and the tooth painless; alveolar abscesses may be painless and yet as dangerous as a carbuncle. Furthermore, the pain may not be in tooth that is involved. Every doctor or dentist who has used the X-Ray in this connection will witness to the statement that there is no other means of diagnosing the infections in the alveolar processes. With hardly less emphasis, it can be stated that many cases of antrum, ethmoid, frontal or sphenoid disease cannot be correctly diagnosed or properly treated without the aid of the roentgenologist.

Second: Having found an abscess, pyorrhea, or diseased sinus, you have only a potential source of metastatic disease. Many conditions, if investigated, will be found to have two, three, or more, adequate etiological

foundations. For example, a patient with an optic neuritis may give a positive Wassermann, positive gonorrheal complement fixation, and show an infected antrum. It is an inadequate diagnosis to conclude that the first condition found is the cause of the disease in question. Finding an abscess in the jaw is not sufficient, without cultural confirmation of the organisms present, and other laboratory examinations.

Third: The proper relation between the patient, his physician and his dentist, became an important matter the moment the connection between septic teeth and systemic disease became evident. This relation has three phases, as it presents itself to patient, physician or dentist.

From the standpoint of the patient, the physician is the medical advisor and is held responsible for everything which affects the general health of the patient. Wherever the condition of the teeth endanger the general health, it is the inescapable duty of the physician to watch and govern the treatment of that condition, until it no longer is a menace to the patient's health.

From the standpoint of the physician, it is his business to make the diagnosis on the teeth, with the aid of the roentgenologist and indicate to the dentist which teeth he considers are dangerous to the health of the patient, and in what way they are dangerous. The pathology of alveolar infection is no different from the pathology of bone infection elsewhere, and the principles governing dental surgery are the same as those governing bone surgery elsewhere. It is the duty of the physician to assure himself that the dental surgery has been properly performed, to know that all root canals have been completely filled, that all pus foci have been sterilized and are healed or healing. Only by the X-Ray evidence of completely filled root canals and X-Ray evidence of new bone formation in old pus pockets, can either the dentist or physician be certain that the pathology has been corrected.

No one can blame a doctor, who takes this attitude, for being just as careful in selecting a dentist to treat his patient, as he would be in selecting an oculist for the eyes or a general surgeon to perform a hysterectomy on that patient. It is neglectful for the doctor to tell his patient to "see a dentist" and "have the teeth attended to," just as much so as it would be for him to say "see a surgeon and have that osteomyelitis operated on." Frequently an alveolar abscess is just as dangerous as a pus pocket in the tibia would be.

From the standpoint of the dentist, just as many and just as serious mistakes are made. The dentist occupies an anomalous position with regard to the practice of medicine, because oral surgery is no more a distinct specialty than are the fields of rhinology, ophthalmology or skin diseases. Many years ago, the medical profession committed the crime of ostracising the dental profession, and the time is rapidly approaching when we must humbly entreat them to come back home. Through many years of

misunderstanding, patients have been treated as if their teeth bore no relation, whatever, to the remainder of their anatomy. Now that the close connection has become so acutely apparent, we are gradually resuming our proper relations, not yet officially recognized. In effect, whatever it may be in name, this relation is that of a physician taking his patient to a consulting oral surgeon for special methods of treatment. However, the details may be worked out in individual cases, that is their proper and ethical relation. The diagnosis should be made, as far as possible, by the physician, completed, where necessary, by the consulting oral surgeon. The point to be remembered here is that this local diagnosis is not made by the physician for the purpose of ascertaining what treatment is to be given the teeth, but for the sole purpose of finding out the relation between local foci and the general health of the patient. So far as treatment is concerned, the dentist, having a superior knowledge of technic, should be allowed to administer such treatment as he thinks will best bring about the results desired by the physician. This may consist in opening canals and draining abscesses, treating abscess pockets by various means, amputation of roots of teeth, sterilizing abscesses with subsequent filling of canals, or extraction of teeth with subsequent treatment of the infection present.

Each profession has at least one legitimate cause for quarrel, with the other.

The medical profession is perfectly right in asking that the character and quality of the hidden dentistry be improved over that which was the rule even three or four years ago. Although the dental profession was many years in advance of the medical profession in sensing the importance of alveolar infections, its members have been woefully unscientific in treating such conditions. William Hunter gave the name "septic dentistry" to that class of work where crowns are placed on teeth whose canals are incompletely filled. There is nothing in pathology more inevitable than the development of abscesses around the apices of such roots.

The dental profession has a legitimate quarrel with the physicians for not giving them the information which a consultant should have. The treatment of alveolar pathology depends on its relation to general pathology, and the dentist cannot be expected to treat the patient with the proper regard for that relation unless he is informed about it. An abscess which has no connection with systemic disease can be treated leisurely, with regard for the tooth and cosmetic appearance whereas a similar condition containing virulent streptococci and with a probable or certain connection with metastatic lesions might require radical surgical treatment. The blame for unsatisfactory results must be laid at the door of the physician, when he withholds information from his consultant.

ROENTGENOLOGY—A METHOD OF DIFFERENTIAL DIAGNOSIS OF GASTRIC SYMPTOMS.

BY

CRUM EPLER, M. D., Pueblo, Colorado.

(Read before the 35th Annual Session of the New Mexico Medical Society, Albuquerque, New Mexico, October 12th, 1916.)

Whenever a condition has been shown to be amenable to successful recognition, although that condition has been long known as a definite pathological entity, it receives renewed attention from the part of the profession most interested in its diagnosis particularly, and from the profession in general later on.

This has been shown to be the case with the organs of the head, chest, and abdomen, one after another—too numerous to mention—and has been observed especially to apply during the past few years to the study of the alimentary tract.

Today we will busy ourselves with a method in an effort to differentiate the confusing and uncertain symptoms associated with the stomach.

If we content ourselves with the classical text-book recitation of the symptomatology of gastric diseases, we are believing that by history and laboratory findings the diagnosis is quickly and properly made. But if we will follow these same cases to the table and dead-house, I am sure we will be chagrined, though convinced that the history and symptoms are only true to pathology in a small percentage of cases.

I would not have you understand that this paper makes an attack upon the typical case, for it does not, but I would that you appreciate that the classical case is a rare species. If it exists at all, it is incidental to a very short period during the course of trouble, certainly not often observed in its incipiency and most surely not during the long tenure of chronicity.

Neither am I decrying history, physical signs, laboratory or any other method, because I fully appreciate their great worth, and constantly use them in my diagnostic work, but I am endeavoring to set forth the importance of roentgenology as a differential method in sifting the true pathology out of the jumble of symptoms that are daily poured into our ears.

Barring cases of acute trauma from escharotics, acute pancreatitis and acute appendicitis, it is doubtful if we ever see an incipient case of abdominal disease manifested by gastric symptoms. This is true because the patient will seldom recognize the very early symptoms, and if he does he will give but little heed to it until it has progressed to a stage where it can safely be classified as subacute.

This brings us then to the period in the progress of whatever disease exists, when the patient complains of stomach trouble and refers all his symptoms to that organ.

Pain is the first symptom complained. It may be localized or it may be indefinite and the patient unable to give a clear description of its position. Nausea or vomiting or both is the next most prominent of symptoms. Around these two will be associated all history and signs of disease that the patient is able to give you.

The stomach itself is only heir to about five conditions of gross pathology, and yet the most salient symptoms of all these five are pain and nausea. The duodenum is afflicted with but few troubles, yet the main symptoms are pain and nausea. The gall-bladder comes in for its share of infectious foreign bodies and new growths, and still its main symptoms are manifest by pain and vomiting. The small intestine may have its lumen partly constricted and held from its great latitude of motion by a Lane's kink, still the symptoms that the patient most complains of are pain and uneasiness in the stomach such as nausea and sometimes vomiting, the colon constricted by Jackson's membrane, immobile cecum, cancer of the large intestine or rectum, hepatitis, acute pancreatitis, et cetera, to say nothing of the chronic appendix and so on, ad infinitum—all have their gastric manifestations in the two cardinal symptoms of pain and nausea or vomiting or both.

Every physician recognizes these facts. The small boy who has too many green apples has pain and nausea, the infant who has over fed cries in distress until the stomach is emptied by emesis; the case of migraine with her toxic system complains of an indefinite pain, and hours of vomiting.

When the patient comes in with a history of stomach trouble for a longer or shorter period, he will relate many symptoms, some pertinent and many not, but the main one is pain. It will then be necessary to institute physical examination, laboratory methods, etc., to differentiate and pick out the one of the many causes setting up the symptoms so common to a great many ills. Of course there are other symptoms besides pain and ill stomach that are not so common to a great number of conditions, but surely there are no pathognomonic symptoms amongst them.

It has been said that the stomach is the alarm box of the abdomen, giving the signal for the fire elsewhere. This seems to be true, but in that it gives the same alarm for all fires, one must look askance if the diagnosis is not missed. We may criticise the stomach for not having a complete and different set of symptoms for the ills of each organ, but we must not accuse it of being sick every time it informs us that its neighbor is in distress. When symptoms so common to a number of diseases are present, it is not sufficient to say that there are indications to enter upon this or that procedure, for the determination of the location of the pathology is as essen-

tial, as it is to know that pathology exists. It is of prime importance to know what pathology exists, how extensive, and where located before any remedial procedure is instituted. This can readily be appreciated by the following illustration. Patient 36, nurse by occupation, began losing flesh, lost her appetite; became nauseated, began vomiting food; then was unable to even retain water; complained of pain in the left costo-vertebral angle, a spot the size of a silver half-dollar; laboratory analysis of the stomach contents showed nothing except an excess of hydrochloric acid varying from 40 to 60. X-Ray examination showed a normal stomach, intestinal tract and gall-bladder region. It determined a deposit in the abdominal cavity to the right and over the transverse process of the third lumbar vertebra, which was slightly movable. Pyelography of both sides showed the kidneys to be normal. Operation proved this to be a calcified deposit in the greater omentum. Patient made an uneventful recovery free from all gastric and pain symptoms. To have treated this case by any method without roentgen diagnosis would have been sheer folly, unscientific and without relief to the patient.

Out of nearly five hundred cases that have come to me during the past three years for diagnosis of gastric symptoms, 21 per cent have proven pathologically true to symptomatology. Many of these were advanced cases of cancer of the stomach, liver, and colon; a few of acute ulcer of stomach with bleeding, and a few whose symptoms did not mask the pathology beyond recognition. 42 per cent were chronic appendices, some associated with stomach disease and some not; 15 per cent were duodenal complicated and uncomplicated; 3 per cent were gall-bladder diseases usually complicated with adhesions and the duodeum. The remaining 19 per cent were covered by pericolic membranes, immobile cecum, Lane's bands, pathology of the kidney, hepatic diseases, etc. These percentages are taken from the histories of roentgen diagnoses. Many of them have been operated, and in cases where reports of surgical findings have been received by me, the X-Ray diagnosis has been correct in 82 per cent of all pathology diagnosed. My twenty years of surgical experience has convinced me that all methods of diagnosis exclusive of the X-Ray will fall far short of this.

It must be acknowledged that gastric symptoms do not always arise from the stomach or part of the stomach of which they are suggestive, in fact they are more frequently the reflex wail of the stomach during the disability of some closely associated abdominal viscera; further the laboratory findings are not always in accord with the gastric pathology, even when it exists, and seldom of great value when the gastric symptoms are reflex, such findings are important, but seldom to be relied upon unless either frequently made or made by the fractional method, and even then the findings will vary according to the reflexes of the stomach, so that their worth is lessened unless in the hands of a diagnostitian who is able to make them himself. Personally I am inclined to use the gastric analyses as a comparison to my roentgen diagnosis rather than an adjunct. One of the

noticeable things about the symptoms of gastric disease is the absence, sometimes, of any symptom of such a grave condition as perforating ulcer until the ulcer has become entirely perforated and the patient is stricken down without warning. After all methods have been used, and the diagnosis has been or has not been made, whether it be located in the stomach or elsewhere, whether it is a simple case true to type, or one so confusing as to be in doubt, the roentgen method should be used, because by that method in proper hands the differentiation of pathology can not only be made but the exact location and extent known.

Now the remainder of this paper was intended to be shown by slides. If you will bear with me a few moments, I will call to mind some of the histories of the slides which I cannot give you.

I. Patient 35, female, seamstress by occupation, unmarried. Three years ago complained, in her words, of "stomach trouble." Had various diagnoses made, from gastritis to possible ulcer of the stomach, ulcer of the duodenum, cancer, and several other suggestions.

She was referred to me by one of the physicians in my town, to determine roentgenologically what the trouble was. I will say in addition to that he sent me the laboratory findings, both of stomach contents two or three times made, as well as a urinary analysis and report of Wasserman. The laboratory findings after Ewald breakfast showed about this: Free hydrochloric acid, 35; total acidity, 68; no blood; no organic acids, excepting those mentioned. Urine normal, except for some indican. Wasserman negative.

In connection with this, I desire to mention some of the symptoms that this patient had. As I said, she was a seamstress, working at her business all day. At about five o'clock each morning—this history comes from her, very carefully taken by myself—she would be awakened by pain and distress in what she called "the pit of the stomach," and the pit of the stomach in this particular instance was an area which radiated around the navel, usually near to the right side and above. She had no nausea, she had no vomiting. This pain and distress would last for a period of about five hours. After ten o'clock in the morning it would disappear entirely, and would not occur again until the next morning. She had lost about 15 pounds in a period of 10 months.

Roentgen diagnosis in this case was made, and I dare say no one in the room can make the diagnosis from the history given and yet it is simple. Roentgen diagnosis of this case was indurated ulcer of the pyloric end of the stomach on the lesser curvature and the posterior wall, encroaching to a very slight degree upon the ring; adhesions between the second portion of the duodenum and the transverse colon; chronic appendix, small and adherent.

This case was referred to me and operated by Dr. H. A. Black, and his operative findings were: Chronic indurated ulcer at the place mentioned;

adhesions of the periappendicular portion of the duodenum; and a small appendix, probably not chronic, which he thought was congenital.

II. The next was a case of duodenal ulcer. Barber, aged 36, gave history of complaining of indigestion, as he put it, for three years past. Had lost about 25 pounds in the last 15 months in weight. His pain came on, sometimes immediately after eating, sometimes an hour after eating, and sometimes two hours after eating. He had no through and through pain. He had no hunger pain. Was constipated to the degree that he had to take physic every night.

Laboratory findings: Slight degree of hyperacidity, bile, otherwise normal; urine normal; Wasserman negative; blood count, 3,800,000 reds and 9,000 something whites, as I remember it.

This diagnosis was made by roentgenological methods, or rather differentiation in the case, and it was found that this man had an ulcer of the duodenum and a patent pyloric ring. This man's stomach emptied in two hours and a half normally.

Was operated, and the findings were verified.

The next case: Farmer's wife, 28, married 9 years, had never been pregnant. Had done the housework on a small ranch, cooking, etc. Was awakened one morning about two or three o'clock sick at the stomach and vomited the evening meal of the night before. She was continuously nauseated and vomited, though she was kept on her feet by the physician for a week, at the end of which time she had to go to bed on account of not being able to retain food and weakness.

The physician suspected that she was pregnant, but, as he said, he eliminated that and referred her to me for diagnosis. This was two weeks after she was awakened in the morning that she came to me. She came on a stretcher. She was given the ordinary opaque meal, with barium in this instance, and, fortunately, retained it.

Fluoroscopically the stomach, particularly the pyloric end, showed some filling defects, but never alike. The diagnosis was made of a normal stomach and normal duodenum, and by virtue of a dilated caput duodenalis, the appendix was suspected.

Her physical signs showed a soft abdomen, no rigidity of muscle whatsoever, no temperature. The roentgen ray findings showed that she had a chronic appendix, tied just as you would tie a club bowknot so to speak. When it was suggested to her that her trouble was probably all appendicial and that an operation was advised, she declared that she had never had a pain in that side in her life, which was probably true. Had had typhoid 12 years before. Operation was performed, patient recovered and has not had any symptoms in the two years and a half since from my personal observation.

Another case which I will mention is a rather unusual one of an annular carcinoma of the stomach. This diagnosis was suspected by the clin-

ican; from a roentgenologic standpoint, it was proven; and in the dead-house, the proof was conclusive. The point I am trying to make here is that the laboratory findings do not always agree with the pathology found, if any, and in this case four months and a half before the man died he had 21 as his free hydrochloric acid and his combined was 45.

I mention these cases as the irregular ones, and in that they are the irregular ones they are the more necessary to be diagnosed, and I know of no other way to differentiate them after all methods have been used than the roentgen-ray. (Applause.)*

*Discussion follows paper of Doctor Wylder.

CERVICAL SUSPENSION FOR RETRODISPLACEMENTS AND PROLAPSE OF THE UTERUS.

BY

DR. HUGH WHITE, El Paso, Texas

(Read before El Paso County Medical Society January 8th, 1917.)

To the men working in gynecological clinics, the frequency of retrodisplacements accompanied by more or less procidentia is very evident. Bryant & Buck in American Practice of Surgery say: "Retrodisplacements are noted in nearly one-fifth of gynecological cases, constituting 17.75 per cent of the combined materials of Winckle, Loehlin & Sanger."

The generally accepted theory of the medical profession is that the principal cause of retrodisplacements is a torn perineum, but in 184 gynecological examinations in the El Paso County Clinic, I found 19 retrodisplacements in multiparae and 14 in nulliparae and as the majority of the women applying to the clinic are multiparae, it would seem that the condition is about as common in the one class of patients as in the other.

We often see women with the perineum torn back to the sphincter ani muscle and the uterus in a normal position, or if with a speculum retracting the perineum we pull the cervix down, when we release the cervix the uterus returns to its normal position with the perineum still retracted. So evidently in the majority of cases we will have to look to another source than a lacerated perineum for the cause of retrodisplacement.

This leads me to believe that the real cause of retroversion is either a short anterior vaginal wall pulling the cervix forward, or long loose utero sacral ligaments allowing the cervix to sag downward and forward. We have seen the latter cause demonstrated by the old pessary which by holding the cervix up in place causes the uterus to lie in a normal position.

There is a paucity of statistics on this subject and all of the literature accepts without comment that the condition is more frequent in the woman who has borne children. However, Mann in American System of Gynecology partially substantiates my position by saying: "I am convinced from careful clinical study that the opinion which is shared by the preponderating majority of gynecologists that retroflexio is rare in the virgin and that we must seek the causes of the origin of nearly all cases of reflexio in the puerperal state is not correct," and the same authority quotes Schultz as saying: "The loss of the posterior fixation is quite particularly the cause of the backward displacement of the fundus uteri."

When the uterus is retroverted, however, further descent is prevented by an intact perineum, but if the perineum is torn we have an extension of the condition in a prolapse. So we might say the cause of a prolapse is a

retroversion with a lacerated perineum. Of all the operations that have been suggested for the relief of these conditions, only two have attempted to fasten the cervix up in place—one, shortening of the utero sacral ligaments, and the other opening the top of the vagina and dissecting up between the bladder and uterus and coapting the tough tissues in the bottom of the broad ligaments in front of the cervix. All of the others have been attempts to hold the fundus over in the normal position, but have left untouched the sagging cervix, and I think have missed the real cause of the trouble. The fact that none of the operations for the relief of this condition have been entirely successful is demonstrated by the fact that there have been well above 100 operations devised for its relief. (Crossen—Diseases of Women.)

I recently saw a patient on whom I did a ventral fixation two years ago for prolapse of the uterus and although the fundus is still in contact with the anterior abdominal wall, the cervix has sagged down and become so elongated that it is apparent at the vulvar opening.

For years I have felt that we were attempting to fasten up the wrong end of the lever, as it were, and a few months ago while holding a postmortem on a case in which there was a prolapse, I found that by fastening the anterior fold of Douglas Cul de Sac to the infundibulo pelvic ligaments and thereby lifting up the cervix, the uterus lay over in a normal position, and this seemed to be a solution of the problem.

The technique is as follows:

Open the abdomen in the median line, catch the fundus of the uterus and pull it well forward, then catch the cervix at the posterior vaginal attachment with a double tenaculum and lift it up and remove the tenaculum from the fundus; next, with your assistant holding up the cervix, pick up the left broad ligament and with a curved needle pass a silk ligature through the clear space underneath the infundibulo pelvic ligament (which is the outer free border of the broad ligament) just below the ovary, then pick up the vaginal wall at its posterior cervical attachment with the same needle, being careful not to go through into the vagina; next pass your needle through the clear space in the right broad ligament in the same position as you did on the left side; then draw your suture up and tie, bringing your three points in contact.

The first picture shows the suture in place, but not tied, and demonstrates the three points and the position of the fundus forward underneath the symphysis.

The second shows the suture tied and demonstrates how the broad ligaments come up around the uterus and hold it, as it were, in a sling. After tying the suspension suture, fasten the sides of the broad ligaments below the tubes to the sides of the uterus with a continuous catgut suture to obliterate the open space between the two, through which a loop of intestine might find its way.

This operation, of course, ties off the ovarian artery, which is included in the silk ligature, but as the anastomosis with the uterine artery is so free and the infundibulo pelvic ligament contains so much more muscular and fibrous tissue than the broad ligament lower down, I think it is justifiable.

Cervical suspension lifts the cervix upward and backward and holds it in this position and the uterus lies over on the bladder and the pressure of the intestines on its posterior surface tends to hold it in this position, so that there is not much tension required to hold the cervix up.

The uterus is perfectly movable and can rise and fall with the filling and emptying of the bladder, and if pregnancy should take place, there is nothing to prevent its rising normally in the abdomen. The dilatation of the cervix also during parturition would naturally force our new formed ligament into the hollow of the sacrum out of the way.

Case No. 1, Mrs. S. C.:

21 years old. Married 2 years. Never been pregnant. Menstruates freely 6 days, with severe cramps. Backache continuous, but worse at menstrual periods.

Cervical suspension done at County Hospital in October, 1915. At last consultation in January, 1916, patient reported complete relief of symptoms and on bimanual examination cervix was felt high up in posterior cul de sac and uterus well forward resting on bladder and anterior vaginal wall.

Case No. 2, Mrs. R. S.:

Has one child 4 years old. No abortions. Has been having severe dysmenorrhea every month, lasting 4 to 10 days, during which time she has been compelled to stay in bed and take opiates. Trouble dated from birth of child. Retroversion of extreme degree with beginning prolapse.

Curettage and cervical suspension at County Hospital in October, 1915, with complete relief of symptoms and perfect position of the uterus resulting.

Case No. 3, Mrs. K.:

36 years old. Mother of 3 children, youngest 18 months. Severe backaches, dysmenorrhea, constipation and dragging sensations in pelvis. Lacerated perineum with beginning prolapse. Retroversion and subinvolution. Perineum repaired and cervical suspension done for Dr. J. M. Richmond at Providence Hospital Nov. 16, 1915. One month later on examination uterus found in an over-corrected position, with cervix high up so that it could just be reached with two fingers in the vagina.

Three months after operation the patient reports entire relief from all her symptoms.

Case No. 4, Mrs. C. F.:

40 years old. Mother of 5 children, youngest 7 years old. Pains in back and legs, pulling sensation in abdomen, irritable bladder, with frequent urination. Retroversion and prolapse of uterus, with cervix showing at vulvar opening. Rectocele and cystocele. Perineum torn back to sphincter ani.

Cervical suspension done at County Hospital Jan. 23, 1916. The perineum was not repaired. Feb. 13, 1916 on examination uterus was found in normal position, cervix high up in vagina. Disappearance of cystocele and a diminution in size of rectocele.

I present this as a preliminary report, in the hope that others of the profession will take it up.

DISCUSSION.

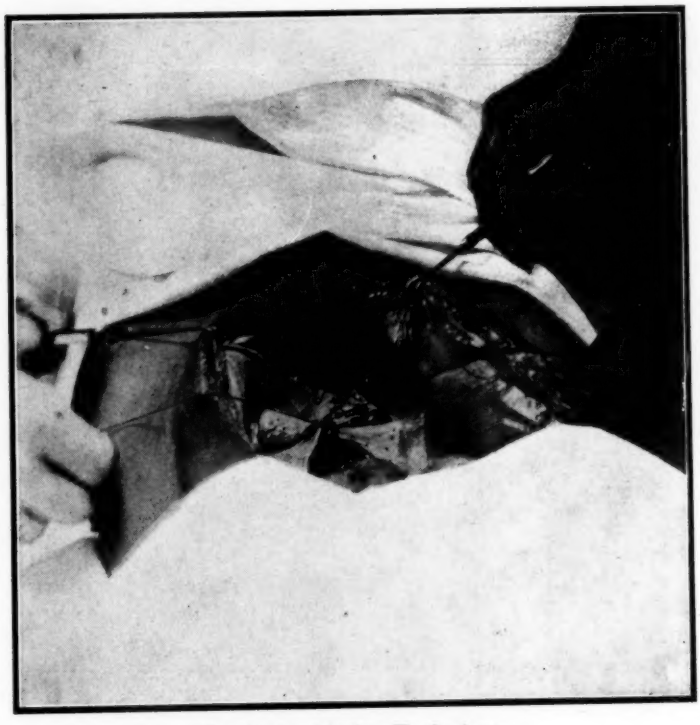
Doctor Hugh Crouse:—There is no doubt that this operation is an improvement over many others for the purpose. There is no one operation that will meet all the needs. I believe that this operation is preeminently indicated where there is great looseness of the parts, and the uterus can be dragged out of the abdomen. I think that it would be better to take up the slack in the peritoneum and the round ligaments too.

Dr. James Vance:—The operation looks very good, but I do not like the use of the silk ligature. I dislike any non-absorbable suture. The essayist said nothing about denuding the musculature of the ligaments before tying, but I suppose that he does this as any peritoneal surfaces tend to pull apart.

Dr. Paul Gallagher:—There is a very similar operation to this in which the peritoneum is stripped back off the front of the uterus and then the round ligaments are brought forward under the flap and sutured to the cervix. Later the flap is returned to its place only a little higher on the uterus, and the redundancy clipped off.

Dr. White (closing):—The shortening of the utero-sacro ligaments do some of the work of this operation, but these ligaments are situated too low down to be able to give any lift to the cervix, which is so necessary. The redundant tissue is taken care of by the proper placing of the sutures. When this is done all the lower pelvic structures are put gently taut. It is then unnecessary to shorten the round ligaments as the weight of the intestines keeps the uterus in the proper position. As silk is used for the suture, there is no need to denude the surfaces.

See Page 46 for Technique
DR. HUGH WHITE



See Page 46 for Technique

DR. HUGH WHITE

Photograph of Case No. 1 Before Operation.
DRS. W. L. and C. P. BROWN

ANCIENT GUNSHOT WOUND OF FOREARM WITH EXTENSIVE SCAR FORMATION AND CONTRACTIONS.

BY

W. L. and C. P. BROWN, El Paso, Texas.

(Read before the El Paso County Medical Society, September 4th, 1916.)

D. M., aged 23 years. Nine years ago, accidental discharge of shot gun, entering front forearm just below the elbow, traversing the entire length of the forearm and coming out just above the wrist. The entire anterior group of muscles, blood vessels, etc., were greatly mutilated, and many shot were left in the tissues. He was under treatment for many months, but the wound healed finally, leaving him in the condition now shown in photograph.

The wrist was flexed at right angles to the forearm, and firmly fixed, not only by contraction of tendons, but also by contraction of skin and fascia. The forearm and hand were under-developed, and considerably smaller than the opposite one. Both extensor and flexor tendons showed some effort at action, on extension and flexion, but the hand was absolutely useless.

Operation.

At operation, transverse incision was made just above the wrist joint, through the skin and fascia, also a long incision in the line of the old scar, up the front of the forearm, which extended almost to the elbow. All the anterior tendons that were left were firmly attached to this scar. The tendons were dissected loose from the scar tissue, and by the splitting method were lengthened four inches. It was necessary to do tenotomy of the flexor carpi radialis and flexor carpi ulnaris, before the hand could be straightened. After complete dissection of the tendons, skin and fascia, it was still impossible to completely extend the hand and fingers, because of contraction of the anterior capsule of the wrist joint. However, extension was so nearly complete that it was not even advisable to do a capsulotomy.

After suture of the lengthened tendons, the tendon of the flexor carpi radialis was thrown over to the midline and used to reinforce the line of suture of the flexor tendons. After straightening the arm an area three inches in length, and the entire width of the wrist, was left without skin. A flap of skin was raised from the anterior aspect of the abdomen, base down—the flap including a large amount of fat—and after being raised the fat was split off from the skin flap and the fat flap being slipped under the tendons and the skin flap with its fat sutured across the front of the tendons, the flap left attached at its base to the abdomen.

After carefully suturing in position, the arm was securely fastened with adhesive straps and bandaged. The flap was cut loose at the end of eight days, and sutured in place.

Practically primary union throughout. The wrist will be finally completely straightened by use of elastic bandage and splint. The flap has just been cut loose today and it is too early to see what the ultimate results will be, however, we have every reason to believe that he will secure a thoroughly useful arm.

Case No. 2.

Re-Formation of Gall Stones Fourteen Years After Removal.

Mr. G. F. H. Operated on 14 years ago for gall stones. A large number removed and gall bladder drained. Health was good for fourteen years, at which time he began to have attacks of gall stone colic again, and at the time of operation he had a phlegmonous gall bladder, full of gall stones.

This case is reported to show positively that gall stones will re-form where the gall bladder is left, after their thorough removal. We assume that they were all removed at the time of the first operation, because of the period of so many years without symptoms, and at any rate we know positively that some have re-formed, as so large a number could not have been left.

There are still certain authorities who state that they believe gall stones never re-form, once completely removed, though there have been a number of cases on record, like this, where is proved the contrary.

MEDICAL PREPAREDNESS

A circular has recently been received from Dr. F. F. Simpson, Chief of the Medical Section of the Council of National Defense, presenting the correlated activities of the medical departments of the government, the Council of National Defense and the Advisory Commission, and the Committee of American Physicians for Medical Preparedness, setting forth the work that has been done up to this time and outlining what is now being done in the line of medical preparedness.

The circular is too long for complete reproduction in this issue but we give below a summary of the most important parts and refer those interested to Doctor F. F. Simpson, Council of National Defense, Washington, for further information:

COMPONENT PARTS OF THE COMMITTEE OF AMERICAN PHYSICIANS FOR MEDICAL PREPAREDNESS

National and State Committees.—In April, 1916, the national committee was constituted by the presidents of the American Medical Association, the American Surgical Association, the Congress of American Physicians and Surgeons, the Clinical Congress of Surgeons of North America, and the American College of Surgeons. That committee undertook the responsible duty of formulating plans whereby the civilian medical resources of the United States might be ascertained and co-ordinated for such purposes as might be required by the federal government.

The national committee appointed a state committee of nine men in each state of the Union. The presidents and secretaries of the various state medical associations are ex-officio members of their respective state committees. It was contemplated that at the proper time committees would be perfected in each county of the country. That time has now come, and county committees are being rapidly organized. The state committees are expected to select the county committees and to supervise their formation.

Name and Personnel of County Committees.—It is the policy of the Committee of American Physicians for Medical Preparedness that the various medical interests and activities of the county shall be represented on the county committees. This is to co-ordinate the interests and activities so that the medical profession shall be in position to aid in the national defense. That this plan may be carried out with uniformity and precision throughout the country, the various state committees have been requested to have all county committees bear the following distinguishing name, to wit, The Auxiliary Medical Defence Committee of————County, in————State, and to provide that the county committees shall include the following resident in the county: all members of National Committee of the Committee of American Physicians for Medical Preparedness; members of the state committee; representatives of the U. S. Army; representatives of the U. S. Navy; representatives of the U. S. Public Health Service; representatives of the state board of medical examiners; representatives of the state or city public health service; ranking medical officer of the National Guard; president and secretary of the local Medical Officers' Reserve Corps Association (if there be such organization); deans of medical schools; president and secretary of the county medical society; president and secretary of other important medical societies; medical director of the local Red Cross units, and other representative medical men.

DUTIES OF COUNTY COMMITTEES

From time to time, specific duties will be assigned to the various state and county committees. These county committees are urged to take prompt action at this time in accordance with the following:

1. That these committees co-operate with the national and state committees of the Committee of American Physicians for Medical Preparedness to make available needful information regarding the civilian medical resources of their communities, and to co-ordinate civilian medical activities for prompt mobilization in case of need.

2. That they secure applicants:

(a) For the Army Medical Corps. For the full complement of troops already authorized by Congress, the regular army needs about 1,200 additional medical officers. If a million men are called, a corresponding increase will be required. (b) For the Medical Officers' Reserve Corps, for which from 20,000 to 30,000 medical reserve officers should be enrolled. (c) For the Naval Medical Corps, which needs about 350 additional officers. (d) For the Coast Defense Reserve Corps of the Navy, for which several hundred high class reserve medical officers are desired. (e) For the National Guard, such numbers as may be required to bring your local National Guard to full strength.

Physicians recommended for service in national defense must be of the highest type. Medical officers who go to field duty should be under the age of 45.

3. That they co-operate, individually and collectively, with the Medical Department of the Army, Navy and Public Health Service and with the Council of National Defense.

4. That they co-operate with the Red Cross in bringing that organization to the point of highest efficiency.

BOOK REVIEWS

Annual Reprint of the Reports of the Council on Pharmacy and Chemistry of the American Medical Association for 1916. Cloth. Price, postpaid, 50 cents. Pp. 87. Chicago: American Medical Association, 1917.

This volume contains the reports of the Council which were adopted and authorized for publication during 1916. It includes reports of the Council previously published in The Journal of the American Medical Association and also reports which, because of their highly technical character or of their lesser importance, were not published in The Journal.

In this volume the Council sets forth the reasons for the rejection of the articles which were examined and found ineligible for New and Nonofficial Remedies. It also explains why certain preparations included in previous volumes are not contained in the latest (1917) edition of New and Nonofficial Remedies. Physicians who wish to be informed in regard to the status of proprietary and unofficial remedies should have the volumes of the Council Reports, in addition to New and Nonofficial Remedies.

New and Nonofficial Remedies, 1917, containing descriptions of the articles which have been accepted by the Council on Pharmacy and Chemistry of the American Medical Association prior to Jan. 1, 1917. Cloth. Price, postpaid, $1. Pp. 412 + xxiv. Chicago: American Medical Association, 1917.

This book lists and describes the non-secret proprietary remedies that have been accepted by the Council on Pharmacy and Chemistry of the A. M. A. It also describes the newer non-proprietary remedies which give promise of some real value that have been accepted by the Council. Each description includes the chief facts physicians desire to know concerning composition, dosage, indications, cautions to be observed, etc. The book also contains general articles which compare the value of the proprietary remedies with the established drugs they are intended to supplant. Every physician who wants to keep abreast of the times should have a copy of this annual.

The Prevention of Disease, a popular book on keeping well by Kenelm Winslow, B. A. S., M. D., formerly Assistant Professor of Comparative Therapeutics at Harvard Medical School. 12 mo. of 348 pages. Philadelphia and London: W. B. Saunders Company. 1916, Cloth, $1.75 net.

Doctor Winslow's "Popular Treatise" on Prevention of Disease, written for the layman, is a book that contains much information that should be given the public. We question, however, that it will serve its purpose for the reason that there is too much mention made of symptoms. Our experience has been that the ordinary layman, after reading such a work, is too prone to find symptoms that do not exist and to cloud his history when he does become really ill.

That the book will find a field of usefulness we do not doubt, but not to the extent hoped for by the author.

Care of Patients undergoing Gynecologic and Abdominal Procedures, before, during, and after operation by E. E. Montgomery, M. D., Professor of Gynecology in Jefferson Medical College, Philadelphia. 12mo. of 149 pages, with 61 illustrations. Philadelphia and London: W. B. Saunders Company. 1916. Cloth, $1.25 net.

The title of this little book is rather misleading, as it contains chapters on general abdominal surgery, including intestinal resection and anastomosis, stomach operations, gall bladder operations, and operations upon the spleen and kidneys. These operations are much better covered of course in the larger volumes on surgery, and seem rather out of place in a book on gynecology.

The volume, as a whole, would be very satisfactory for nurses and students, but is too elementary to be of any value to the general surgeon. Even a beginner of surgery would wish to consult a volume of more extended information, or at least should do so, before he undertakes any of the operations described in the book. Consequently, it would mean a duplication for him to read this volume.

The great number and excellence of the illustrations showing the instruments necessary in the different operations, would be very valuable for nurses.

We note that the author advocates giving patients their cathartics 24 hours prior to operation, which we think a most excellent idea, and should be generally practiced as they are much less likely to have post-anesthetic nausea.

He advocates drainage of the Douglas' cul de sac through a post cervical incision into the vagina, instead of abdominal drainage, which certainly meets the mechanical features very much better, and should be more often practiced than is usual. Removing iodine from the abdominal wall before the incision is made, is also advocated on account of the intestines coming in contact with it and later causing adhesions. For those who do not completely protect the bowels from the skin, this is a most excellent idea. However, this contact should not occur under any circumstances if the skin has been properly protected with towels, fastened to the margin of the abdominal wound.

It is also noted that the author advocates the operator standing to the left of the patient while doing a laparotomy. This strikes us as being rather contrary to the general custom, and we imagine would be a question very greatly of habit or practice.

In the chapter on shock, a dram of adrenalin in salt solution given intravenously is advocated. We assume the author refers to the standard 1 to 1000 solution, under which circumstances we feel that a dram would be quite a liberal dose, given intravenously. Also the practice of giving saline solution under the breast should be discontinued and given in the axillary space, as mentioned in the same connection by the author. There have been a number of cases of sloughing of the breast from the practice of giving saline beneath it, which may have been due to too much pressure or too hot solution, either of which is always liable to occur where people more or less inexperienced are giving the solution during an operation when the surgeon's attention is attracted elsewhere. Consequently, we believe the practice should be discontinued.

The general information in the little book, on the whole, permits of little criticism, except we believe it to be rather too elementary in its character to be of any special interest to the surgeon who undertakes to do abdominal work.

—W. L. B.

PROPAGANDA FOR REFORM.

Effect of Opium Alkaloids on the Ureters. According to D. I. Macht morphin and the opium alkaloids having a similar constitution increase the contraction and produce a greater tonicity of the ureter, whereas papaverin and the opium alkaloids constituted similarly produce a slowing or total inhibition of the contraction and relaxation of the tonus. In opium and pantopon, which contains the total alkaloids of opium, the effect of the morphin group preponderates. Ureteral colic is due to spasmodic contractions of the ureter caused by the irritating calculus and hence the use of papaverin or opium is more rational than that of morphin. Furthermore, the slighter toxicity of papaverin, its tonus lowering power and its local analgesic properties suggest its local application in spasmodic conditions of the ureter. (Jour. A. M. A., March 3, 1917, p. 719.)

Dating of Biologic Products.—For the protection of the consumer as well as the manufacturer, the Council on Pharmacy and Chemistry has adopted a rule requiring that serums and vaccines and similar products to be accepted for New and Non-official Remedies must bear on each package the date of its manufacture in addition to the date required by federal law. The practice now followed by manufacturers of placing on the containers of biologic products the date beyond which these agents are not to be regarded as dependable (though in accordance with the federal law) has not been satisfactory. Except for diphtheria and tetanus antitoxin, in general there are no methods for determing the potency of serums and vaccines. At the present time, for the same material, one manufacturer will fix an expiration date of four months, others one year or even eighteen months. Obviously this lack of uniformity is unfair to the manufacturer who endeavors to supply a product as fresh as is commercially practicable and it also may lead the physician to form a false opinion regarding the potency of certain biologic products. The new rule of the Council will enable the physician to know the age of a given product when it reaches him and will permit him to judge whether or not it has been kept unduly long. Moreover, it will prove not only helpful to the conscientious manufacturer and the physician but will also safeguard the patient. (Jour. A. M. A., March 3, 1917, p. 728.)

Another Shortage of Salvarsan.—The indications are that the supply of salvarsan and neosalvarsan in this country has again reached the point of exhaustion. Congress, which made our patent law, has the power to suspend the patent on any preparation that the patentee is unable to, or does not supply, when such suspension is in the interest of public health, and it should suspend the salvarsan patent. In the meantime it is to be hoped that the Dermatologic Research Laboratory of Philadelphia will again supply the product as it did during the previous salvarsan shortage. (Jour. A. M. A., March 10, 1917, p. 785.)

Rheume Olum.—The Council on Pharmacy and Chemistry reports that Rheume Olum (The Rheumeolum Chemical Co., Seattle, Wash.) is said to be composed of camphor 7 per cent., chloral hydrate 7 per cent., menthol 2½ per cent., methyl salicylate 25 per cent., oil cajuput 2½ per cent., oleoresin capsicum, lanolin, white wax, "qs." The Council found Rheume Olum unacceptable for New and Nonofficial Remedies because the amount of the potent oleoresin of capsicum was not declared, because unwarranted therapeutic claims were made, because the name was nondescriptive of its composition and therapeutically suggestive and because the fixed formula was considered irrational. (Jour. A. M. A., March 17, 1917, 865.)

Control of Intestinal Bacteria.—A recent investigation indicates that the direct feeding of bacterial cultures of lactic acid producing organisms had almost no influence on the intestinal flora. On the other hand the administration of milk sugar (lactose) brought about a marked change in the intestinal flora. It appears therefore that the beneficent action of milk cultures is dependent on the lactose and not on the bacteria which they contain. (Jour. A. M. A., Mar. 24, 1917, p. 918.)

The Sargol Case.—The exploiters of Sargol, the get-fat-quick nostrum, were found guilty of fraud and were fined $30,000 after promising that the business would be discontinued. Sargol was made by Parke, Davis & Co. at a price of 53 cents to 78 cents per thousand tablets. Sargol was stated to contain extract saw palmetto, calcium hypophosphite, sodium hypophosphite, potassium hypophosphite, lecithin,

extract nux vomica. The trial is said to have cost the United States over $100,000. Although the business was palpably fraudulent, although the claims made for the nostrum were palpably false, the defendants were able to employ physicians to go on the stand and swear that Sargol was a "flesh builder" and "bust developer." (Jour. A. M. A., Mar. 24, 1917, p. 927.)

Betaine Hydrochloride.—It contains 23.8 per cent absolute hydrochloric acid and 8 grains corresponds to about 18 minims of diluted hydrochloric acid. In solution betaine hydrochlorid dissociates into hydrochloric acid, but it is not so efficient in aiding the action of pepsin as an equivalent amount of hydrochloric acid. (Jour. A. M. A., Mar. 24, 1917, p. 931.)

MEDICAL LEGISLATION IN ARIZONA

The Third Arizona Legislature, recently in session in Phoenix, considered an unusually large number of bills of more or less interest to the medical profession. Of these only three passed, and one of these was designed to meet an emergency in Mohave County. This bill permits the admission of patients, other than indigents, to County Hospitals, when they can pay for their care, and is intended to apply to counties where no other hospital, except the County Hospital, exists.

House Bill No. 55, abolishing the common drinking cup and common towel in all public places (barber shops, lavatories, etc.) passed and is now a law.

The Legislation of most interest to the medical profession of the State was the amendment to the Medical Practice Act, which authorizes the Examining Board to make contracts of reciprocity with other states and to extend an examination of a different character to practitioners graduating prior to 1901. There is an apparent conflict in this bill which will, unless removed by legal interpretation, nullify the reciprocity clause. The bill, after its passage, was examined by the Committee on Public Policy and Legislation of the State Association, at the request of Governor Campbell, and approved by them, so far as its intent is concerned.

Bills of more or less merit introduced and failing to pass were the following:

S. B. 5, for the Establishment of a State Hospital for Disabled Miners.

S. Bills 32, 33 and 34, for the Conservation of Vision. These were introduced by request of Dr. Ancil Martin, who represented the American Medical Association's Committee on the Conservation of Vision. These meritorious bills never came to a vote.

S. B. 82, for the Establishment of a Home for Feeble Minded. This was a carefully prepared and very desirable piece of legislation, which passed the Senate unanimously and was not taken up by the House, owing to lack of time, else it would have passed that body also.

S. B. 110, for the Establishment of a Ward for the Criminal Insane at the State Prison. This bill, introduced by Senator Ferguson of Santa Cruz County, deserved passage, but was not taken up by the House, after passing the Senate. It aimed to establish a separate ward for the criminal insane, at very little cost.

S. B. 126, Amending the Statute Regulating the Practice of Dentistry. This vicious amendment failed to pass. It is of interest to us

because the medical and dental professions are too closely allied for either to remain passive when the high standards of the other are being attacked.

H. B. 70, Creating a State Board of Optometry. This deserves discussion by the State Association.

H. B. 140, Providing for the Reorganization of the State Board of Health. This bill never came to vote.

This collection of legislative ideas illustrates one thing, at least; that is, the inadvisability of introducing such bills without the approval and co-operation of the proper Committee of the State Medical Association. The bills introduced by Dr. Martin were sponsored by the American Medical Association, but all the other bills should have been passed on by the State Association before their introduction. The bill for the Establishment of a Home for Feeble Minded was the only bill introduced which was sanctioned by the Committee on Public Policy and Legislation and, of all those enumerated above, most deserved passage.

—W. W. W.

Dr. W. W. Wilkinson, of Phoenix, has recently retired from general practice to enter the special field of electro-therapy and deep X-Ray therapy. Dr. Wilkinson has been engaged in electro-therapy, in conjunction with general work, for many years. During the past fall he studied under Dr. Skinner, of Kansas City, and with other roentgenologists of the east and Pacific Coast, and concluded to limit his practice, in the future, to the fields mentioned.

So far as we know, Dr. Wilkinson is the first man in Arizona who has properly equipped himself, by study and apparatus, for deep Roentgen therapy, requiring, as it does, special technic and powerful transformers. It is to be hoped that he will receive the encouragement he deserves in his special work.

MARICOPA COUNTY (ARIZONA) NEWS

At the March 10th meeting, the Society had the privilege of a talk by Dr. E. Fletcher Ingals, Professor of Diseases of the Chest, Nose and Throat at Rush Medical School. Dr. Ingals gave an impromptu resume of his observation, as a member of the Board of Trustees, of the early struggles of Rush in its efforts to make of itself a first-grade school. Following this, he digressed to the subject of Angina Pectoris, and gave an interesting lecture on this subject.

At the meeting, held March 24th, the Society was again favored, being addressed by Dr. Maximilian Herzog, Chief Pathologist for Cook

County Hospital, who is visiting Dr. Sweek of Phoenix for a month. Dr. Herzog, as is well known, is one of the foremost pathologists of the country, is a fascinating speaker and was given a very cordial welcome by the Society.

MOHAVE COUNTY (ARIZONA) NEWS

The Mohave County Medical Society reports the death of their pioneer member, Dr. Alexander M. Cowie, at Kingman, March 18th, from bowel perforation.

Dr. Cowie has lived and practiced in Kingman for 22 years; he was born in Canada in 1864; graduated from McGill University in 1887, and for eight years was ship surgeon in the Merchant Marine, coming to Kingman in 1895.

At the time of his death, and for many years previous, he was secretary of the County Society and County Physician. The medical profession of the entire state will join with his confreres of Mohave County in their sorrow at the death of another of our pioneer physicians.

DR. JOHN W. TAPPAN
314 Mills Bldg.
Office Hours: 11 a. m. to 1 p. m.
4 to 6 p. m.
El Paso, Texas

CROUSE
X-RAY LABORATORY
Charles G. Lunan, Director
510 Roberts-Banner Building
EL PASO, TEXAS

F. P. MILLER, M. D.
Physician and Surgeon
514 Martin Building
El Paso, Texas

DR. J. A. RAWLINGS
Practice Limited to
DISEASES OF CHILDREN AND OBSTETRICS
404 Roberts-Banner Building
El Paso, Texas

DR. RAMEY
515 Mills Building
El Paso, Texas

DR. J. E. KELTNER
Physician and Surgeon
Special attention given to Obstetrics and Gynecology
1018 Mills Building
El Paso, Texas

DR. E. H. IRVIN
Practice limited to Eye, Ear, Nose and Throat Work
401 Roberts-Banner Building
EL PASO, TEXAS

DR. W. R. JAMIESON
616-17-18 Mills Bldg.
El Paso, Texas
GENITO-URINARY DISEASES AND SURGERY
and Cystoscopic Diagnosis

DR. JOHN J. McLOONE
Practice limited to
EYE, EAR, NOSE and THROAT
Suite 306
Goodrich Building
PHOENIX, ARIZONA

DR. J. A. PICKETT
314 Roberts-Banner Building
EL PASO, TEXAS

WIP ROBINSON
DENTIST
304 Roberts-Banner Building
El Paso, Texas

DR. E. R. CARPENTER
Practice Limited to
DISEASES OF EYE, EAR, NOSE and THROAT
310 Roberts-Banner Building
El Paso, Texas

Southwestern Medicine

VOL. I El Paso, Texas, May, 1917 No. 5

ROENTGEN THERAPY.

BY

W. W. WILKINSON, M. D., Phoenix, Arizona.

(Read before the meeting of the Arizona Medical Association, Douglas, Arizona, April 18, 1917.)

Scarcely any fact in regard to roentgenology is more known to medical men, then that unprotected X-ray workers become sterile. In a number of States laws have been passed providing for the sterilization of various classes of defectives, and surgical methods are likely to be superseded by roentgenization as safer and more humane.

While we recognize the value of the X-ray in sterilizing defectives there is another class to whom this treatment is a great boon, a class in which we all have a very deep personal interest, and a class to which we are, fortunately, more closely related; I refer to our mothers, wives, and sisters who are approaching the menopause. Women have always borne peculiarly heavy burdens and it is, indeed, a happy day when we, as physicians, are able to free them from a burden that has become increasingly heavy as civilization has advanced. Women quite generally approach their fourth decade with considerable dread and apprehension on account of the stormy time which many of them experience at this period. The hot flushes, nervousness, sleeplessness, irregular menstruation with dysmenorrhea and menorrhagia; the psychic disturbances, even to the sad sequence of an unbalanced mind in some cases, are symptoms which cause dread and apprehension, because we as physicians have given them inadequate relief. Here, roentgen therapy is supreme, and, by destroying the remaining Graafian follicles we can, in a short time, relieve all these symptoms. Happily only the Graafian follicles are destroyed, and the important internal secretion of the ovary is not interfered with, when cases are not overtreated. This statement is true for women over forty. More massive doses are required to destroy all the ovarian follicles in younger women, and the destruction of the ovarian function is, in these cases, complete. Ovulation being impossible there can be no menstruation, menorrhagia or dysmenorrhea and the nervous and psychic symptoms promptly disappear. The ability to bridge physical and mental strain of the climacteric is a notable triumph in the healing art, which, when generally employed, will add materially to the prestige of our beloved profession.

It is doubtless desirable to sterilize most tuberculous married women; also unmarried women who have lung trouble, where menstrual disturbances are a factor in preventing recovery; likewise women who are having frequent miscarriages or too many children. Some cases of specific infection, nymphomaniacs and masturbaters might be included; also cases of deformed or contracted pelvis.

A lady of my acquaintance, who is in her eightieth year and who is still able to do some general nursing, says she never had a well day until after change of life, which occurred in her thirtieth year, and since that time she has scarcely had a sick day, and has led an exceptionally energetic life. There are married women, with menstrual difficulties, of impaired health, who have never become pregnant, to whom a permanent cessation of menstruation induced by raying, would bring health and happiness.

Dr. Sidney Lange, of Cincinnati, reports fifty cases of artificially induced menopause in women of various ages. One unique case is that of a young woman who had epileptic seizures at every menstruation and was cured of her fits by roentgen sterilization. Dr. Lange, in answer to a letter of inquiry as to the condition of patients immediately following treatment, wrote me as follows: "None of our cases had any psychic disturbances following the treatment. The greater percentage had hot flushes, but these subsided after a few weeks time and all of the patients were much improved both mentally and physically after the artificial menopause. Those cases in which there were strong symptoms at the time the treatment was undertaken, experienced a disappearance of these symptoms after the artificial menopause was established.

TUBERCULOUS ADENITIS.

In addition to destroying the Graafian follicles of the ovary, when indicated, we would call attention to the fact that the lymphatic glands are very susceptable to the action of the roentgen ray. It is the best treatment for tuberculous adenitis. Dr. Russell H. Boggs in a paper on this subject says, "Striking results are frequently obtained in large glandular masses even when suppurating or about to break down. Many of these cases are as permanently benefited as cases in which the glands are only of small size. These facts suggest that in the destruction of tubercular tissue autogenous vaccines are set free, which are superior to tuberculin. This probably accounts for a tuberculous process disappearing in one part of the body when a tuberculous mass is rayed in another part. Several times I have had tubercle bacilli entirely disappear from the sputum of a patient being rayed for tuberculous cervical adenitis."

Shultz says, "Tubercular glands are similar in specific gravity to the normal skin. The high absorption capacity of these glands is evidently connected with a high specific sensibility as it is often astonishing how quickly even deepseated tubercular glands react to small doses of rays. I observed in a series of three cases of tuberculous glands in which the con-

nection between the skin surface and the gland was established by a fistulous sinus, that after a few radiations the glands were pressed out through the sinus, just like the passage of the head at birth. This movement of the gland I could only explain to myself by an exuberant growth of the deep-seated connective tissue."

LEUKEMIA.

Not only lymph glands but all lymphoid tissues are very susceptible to raying. Hence, lymphatic and splenomedullary leukemia, (especially the former type) are benefited by thorough deep roentgenization. This is to be expected, as sarcomas are quickly destroyed by raying, and leukemia has been called blood sarcoma. Repeated relapses usually occur and respond to treatment, but in the end the disease and not the physician is the victor.

HODGKIN'S DISEASE.

We believe no up-to-the-minute practicioner will attempt to treat Hodgkin's disease without roentgen therapy. When cases are rayed reasonably early, improvement with arrest of disease results with some cures. Dr. Arthur Fenwick Holding and Dr. Samuel Brown of New York, in their article on Hodgkin's Disease, which appeared in the March number of the Journal of American Medical Association say: "We feel that particular emphasis should be laid on the necessity of extensive roentgen treatment in all of these cases immediately after the diagnosis is established. The roentgen rays should be given over all lymphatic structures of the body, including the mediastinal and abdominal lymph nodes, thus giving a general action which, in proper dosages, we have invariably found to improve the patient's general physical condition instead of weakening him as the extensive surgical operations did in the fully developed stage of the disease."

ANEMIA.

In this connection we would call attention to the fact that pernicious anemia is usually benefited if stimulating doses of penetrating rays are administered at frequent intervals to the spleen and the long bones. The earlier the treatment is instituted the better the results.

GOITRE

All the ductless glands are very radio-sensitive. Rarely does the X-ray fail to cure exophthalmic goitre in young women. Pfender says, "The time is approaching when every case of exophthalmic goitre will be thoroughly rayed before surgical procedure will be considered."

THYMUS.

Enlarged thymus glands shrink like a sponge exposed to Arizona sunshine. Skinner says, "This is one of the most brilliant fields of roentgen therapy. In one or two treatments the condition is relieved." Let us keep in mind that asthmas due to an enlarged thymus are promptly cured.

HIGH BLOOD PRESSURE.

If depressing thyroid activity by raying is rational and successful treatment for hyperthyroidism, why not apply this remedy to the suprarenals in the early stages of high blood pressure? Zimmer and Cottenot report permanent lowering of high blood pressure by roentgenizing the adrenals.

FIBROIDS.

Fibromas and myomas of the uterus are usually markedly benefited by the physiological menopause, consequently we might expect the depression of the ovarian function by roentgenization would favorably influence these growths. Roentgenologists, both at home and abroad, are unanimous in their report of favorable results in their treatment of these benign tumors of the uterus. Grier says, "The value of the X-ray in the treatment of uterine fibroids rests chiefly upon their effect upon the ovaries. After X-ray treatment large fibroids often reduce to a very small size or disappear altogether. The reduction of tissue is too great to be due to direct action of the rays alone, and is mostly indirect, from the action of the ovaries upon the uterine circulation. Menorrhagia is perfectly controllable by this treatment."

SKIN.

The value of roentgen therapy in diseases of the skin is attested by the fact that all skin hospitals and leading skin specialists use this form of treatment. It has been found that the human skin absorbs 50% of the rays from a gas tube. Usually only chronic skin diseases should be treated. The following skin diseases are amenable to roentgen rays: subacute and chronic eczema, pruritis, psoriasis, prurigo, ringworm, lupus vulgaris and erythematosis, scar keloids, lipoma, warts and rodent ulcer; also many less common skin diseases. As both the skin and small blood vessels are highly susceptible to the rays we should expect that nevi or birthmarks would be destroyed, which is the case. The stimulation of the growth of connective tissue is a factor in the destruction of nevi.

MALIGNANCY.

All malignant tumors should be removed surgically and then followed by a course of thorough raying extending over several months. This procedure is universal in our large clinical centers. Small superficial epitheliomata and carcinomata, when treated early, are usually cured without excision. The axillary and substernal lymph glands may, at the time of the removal of a carcinomatous breast, show no enlargement. However after a time they do enlarge and we have recurrence of the disease if the glands have not had a thorough course of raying following the operation. Cases of inoperable carcinoma are relieved and made comfortable by treatment; the pain promptly disappears, the discharge is lessened, life is prolonged, the tumor shrinks and some cases become operable. In speaking of carcinoma Dr. Robert Knox, of London, says, "In all cases where time permits X-ray

exposures should be given. There should be no delay in performing the operation, but usually a few days elapse between diagnosis and operation and during these one dose at least may be administered." Unitedly, surgery and roentgenology are achieving quite brilliant results in malignancy, while the results of either independent of the other are disappointing. It is true here, as in all specialities of medicine, that, united we stand, divided we fall.

The 1914 Noble Prize for Physics, was awarded to Max Von Laue, of Frankfort-on-the-Main, for demonstrating that roentgen rays are the same as light rays, except that their wave length is much shorter. Their wave length is only one ten-thousandth that of light and, consequently, they are invisible. Since these rays are no longer an unknown quantity, Roentgen Ray is a more accurate term than X-ray. Marx found the velocity of roentgen rays identical with that of light rays. However, they exhibit many differences. They are not reflected by media in general, they do not heat the tissues, and they have extraordinary powers of penetration through substances opaque to light. Gamma rays of radium are analogous and probably identical with roentgen rays since they are ether vibrations; while the alpha and beta rays of radium are, respectively, positively and negatively charged particles of matter. Eve has shown that beta rays are transformed to gamma or roentgen rays when a screen is interposed. Chadwick has shown that the same is true of alpha rays. Gray demonstrated the converse, that the stopping of gamma rays produced beta rays. The calcium and iron of our tissues produce these changes in the rays.

The rays have a selective effect, some tissues being highly susceptible and others not being at all influenced by exposure. Bergonie and Tribondeau stated that immature cells and cells in active state of division are more sensitive to roentgen rays than are cells which have already acquired their fixed adult morphological or physiological characteristics. Cells with large nuclei are also very radio-sensitive. With the exception of bone and cartilage, which are not affected by raying, Shultz demonstrated that tissue sensibility depended on its specific gravity. The heavier the organ the more susceptible to roentgen rays. As ovaries have, when we except bone and cartilage, the highest specific gravity of any body tissue, they are most susceptible to rays. Skin, thyroid gland, connective tissue, mucous membrane, spleen and liver follow in the order named. The intima of capillaries is very susceptible and easily destroyed.

Bacteria are not injured by exposure to roentgen rays of the duration of ordinary treatment. Murphy and Ellis found that mice inoculated with bovine tubercle bacilli became less resistant to the infection following X-ray treatment. This is probably due to the depressing effect of the rays upon all of the white blood corpuscles. Only glandular, bone, and skin tuberculosis are benefited and usually cured by roentgen therapy. Tuberculous substernal lymph glands are no exception to the rule, that such are cured by X-ray treatment. The lungs of patients actively tuberculous should

not be treated. In arrested cases where the lymphocytes have completed their work, it may be that stimulating doses may increase connective tissue growth. Such beneficial results as have been reported from treatments with one m. a. target skin distance of fifteen inches, with a gas tube, must be due to the counter irritant effect of the rays upon the skin.

Roentgen rays, like light rays, in small doses are stimulating, in larger doses depressing and in still larger doses destructive to tissue. The sun burned back which followed the first visit of the season to the old swimming hole resembles a slight X-ray burn or dermititis. The great advance in roentgen therapy during the past three years has been due to the Coolidge tube, the use of filtered rays and improved transformers. We are now able to give thirty times the former dose, and regulate accurately the penetration, quality, and quantity of the rays.

At the annual meeting of the American Roentgen Ray Society, in Chicago, last September, Prof. Coolidge showed a small metal X-ray tube. He has succeeded in hermetically sealing the pores of the metal and when he succeeds in sealing the window so that the vacuum will be maintained indefinitely, this tube will, to a great extent, take the place of radium as it can be introduced into the cavities of the body, and new luster will be added to the name of the quiet little worker of Schenectady, N. Y., Prof. W. D. Coolidge.

In concluding I desire to quote the following paragraphs from a recent paper of Dr. Wm. J. Mayo.

> Beatson of Glasgow found that in some hopeless cancers of the breast, removal of the ovaries produced an extraordinary effect on the cancer, several patients of this discription being apparently cured. Beatson is a most distinguished as well as conservative surgeon, and his results, which have been duplicated by others, will show the remarkable effect of stopping the internal secretion of the ovaries.
>
> One cannot escape from the conviction that in myomatous disease, the use of radio active substances is destructive—non operative, but not conservative. In the great majority, if not all, of the cases in which the myomas completely disappear under their use, the patient loses the function of the ovaries, tubes and uterus, although the nonfunctionating remnants were left in situ."
>
> Colwell and Russ show that irradiation acts markedly to obliterate the capillaries, perhaps because they have only the inner endothelial coat. It does not act to a great extent on the larger three-coated blood vessels. This peculiarity accounts for the splendid results obtained by irradiation in vascular and lymph tumors, and also for the extraordinary reduction of the enlarged leukemic spleen. The splenic vessels have only the inner coat. Colwell and Russ, however, show that islands of cancerous tissue cling to the larger vessels where irradiation will seldom destroy them.

The latter fact serves to emphasize the statement made in this paper that all malignant tumors should be removed surgically and then a thorough course of X-ray treatment instituted, the course extending over at least a year.

EXTENSION OF TUBERCULOSIS OF THE LUNGS AS SHOWN BY THE X-RAY.

BY

COLONEL GEORGE E. BUSHNELL, Medical Corps, U. S. Army, Fort Bayard, N. M.

(Read before the 3rd Annual Meeting of the Medical and Surgical Association of the Southwest, El Paso, Texas, Dec. 8th, 1916.)

As Cohn says, morbid changes in the lungs are shown by shadows due to two substances: first, blood; second, fully organized connective tissue. Blood imprints a shadow on the negative only when present in abundance. The congestion of lobar pneumonia is typical. Broncho-pneumonia of tuberculous origin may also cast shadows, but only when the process is acute, the congestion great. Frequently the tuberculous process runs so chronic a course that the inflammatory reaction is insufficient to congest the lung enough to produce a shadow. The shadow of congestion is not sharply outlined, it melts away at its borders.

Connective tissue in the parenchyma of the lung away from the hilus is not normally present in sufficient quantity to retard appreciably the passage of the X-rays except as it occurs in connection with and as a part of the various tubes, bronchi, blood vessels and lymphatics. As a result of proliferative inflammation, connective tissue occurs as a fibrous thickening of these tubes, particularly the bronchi and the lymph vessels, which cast a shadow deeper than normal; the older the process and the better organized the tissue, the denser the shadow and the sharper its outline. Tubercle caseations as such, cast no shadows distinguishable from the other tissues of the parenchyma. Cohn (1) found that cubes, 1 cubic cm. in size, of caseous tubercles when embedded in a healthy lung were indistinguishable by the X-ray. But if the caseations become calcified or are even impregnated abundantly with lime salts they become opaque to the X-ray. We should then add lime salts as a third substance, the presence of which shows a morbid change. Indeed it may well be inquired whether the sharpness of the shadows from old, fully organized connective tissue may not be due largely to its impregnation with lime salts, for we know how readily deposition of these salts occurs in the fibrosis of chronic proliferations, in which case our three substances are again reduced to two. We have then one substance, blood, which characterizes acute parenchymatous inflammation and one (or two) other substances which characterize chronic inflammation or the result of chronic inflammation, namely, indurated fibrous tissue.

Of course fuzziness of outline, mossy shadows, marbling, may conceivably be due in whole or in part to the approximate superposition of

various shadows in different planes, the remoteness of a part of which leads to indistinctness of outlines, though the individual opacities may be sharp. But in general, and especially if we are dealing with the shadows of tubes, we may say that fuzziness of outline means acute vascular congestion, an active process. On the other hand when the shadows of the tubes are sharp we have a process which if active at all is at least not characterized by great acuity: is not congestive. Stuertz speaks of what he calls dry tuberculosis of the lung tissue, which inclines to abundant formation of connective tissue, to dry caseations and cicatrizations or to complete transformation into fibrous tissue, as characterized by sharply outlined granular spots and by more or less sharply marked bands and streaks. (2) We would call especial attention to the persistence of the sharply outlined dots and lines when no tuberculous activity longer exists. We can not emphasize too strongly the point which is so frequently overlooked, that the sharply outlined thickenings of the bronchi and other tubes may be evidence of an old inflammation now entirely obsolete, may be simply records of the ancient history of the pulmonary tuberculosis.

We do not see tubercles in the X-ray negative. What we see is either sharply outlined calcifications and fibroses, or fuzzy congestions, or a combination of the two conditions. Cohn (1) states that he has seen cases in which X-ray in general gave the same findings in both lungs while autopsy proved one lung severely, the other slightly, diseased. Such cases illustrate well the limitations of X-ray diagnosis. What Cohn saw in the X-ray negative was probably the thickened framework of old inflammation in the two lungs, in one accompanied by much parenchymatous disease of recent origin, in the other accompanied by little, the said parenchymatous disease being invisible to the X-ray because neither sufficiently congested nor sufficiently organized to cast shadows.

We do not then see tubercle as such any more than we see tubercle bacilli in the X-ray; we see only the results of tuberculous inflammation. It is necessary to insist upon this point because failure to appreciate it has been the cause of much faulty diagnosis. What can be more lamentable in every way than a diagnosis of active pulmonary tuberculosis based on the existence of sharp lines and dots, which are really signs of an old process, the diagnosis being supported it may be by a positive tuberculin reaction, which of course is not by any means necessarily an evidence of activity of tuberculous disease. True, a lung which shows only sharp lines and dots may nevertheless be the seat of a recrudescent tuberculous process, but the fact must be proved by other evidence than that afforded by radiological examination.

Friedrich Muller says: "The exaggerated expectations once had for the X-ray illumination have not been fulfilled. It is the experience that fresh and not extensive inflammatory processes, as some broncho-pneumonias, or recent tuberculous infiltrations, escape the X-ray negative.

It was pointed out in a discussion on the X-ray at Berlin that we can not recognize fresh tubercles in the lungs, with the same disappointment that Laennec and Skoda felt when they recognized the fact that even an extensive miliary tuberculosis presented no perceptible signs to auscultation and percussion." (Zeitschrift f. Arztliche Fortbildung, 9, 1912, p. 417.)

If a certain number of inert solid particles are present in the streaming fluids of the body they will be disseminated in a way which will vary according to their number, place of entry, etc., but their distribution will depend upon purely physical laws. If we suppose tubercle bacilli to circulate in a body devoid of resistance, the distribution of primary tubercles will likewise depend upon the laws which govern the flow of the body fluids—tubercles will form wherever the conditions permit the lodgment of the bacilli. Tuberculosis of this kind is never met with. It is approximated only in animal experimentation, and, in the human subject, in miliary tuberculosis and in the final dissemination of tubercle which immediately precedes death. In the great majority of cases of human tuberculosis, tubercles do not develop everywhere that tubercle bacilli are present, on the contrary, the location of tubercles is determined by the greater or less resistance of the organism. In some cases the resistance is slight, the tubercle bacilli are able to develop in many locations, in others the resistance is high and tubercle bacilli can form tubercles, that is, can multiply, only under conditions that are most favorable for them.

Nothing is more confused than the picture presented by old and advanced tuberculosis of the lungs. The laws which have governed the deposition of tubercle are no longer to be deciphered, the original course of the disease can only be conjectured, so much is it obscured by the late growth and coalescence of foci. I have long felt that to understand clinical tuberculosis we must approach it from the standpoint of immunity, i. e., we must study the resistance of the organism and endeavor to learn how such resistance affects the growth and dissemination of the foci. I have already written on this subject from the standpoint of the clinician with only incidental reference to the radiological side. It is proposed in this paper to consider what corroborative evidence can be adduced from X-ray negatives in support of the theory already advanced. The theory is briefly this: While in the thoroughly immune individual in perfect health tubercle bacilli are shut up in the bronchial glands, are restrained from growth at certain times as in intercurrent disease, exhaustion from overwork or excesses of any kind, bad hygiene, etc., individuals of even high resistance pass through periods of depression during which the micro-organisms are able for a time at least to develop their activities. The resistance still remaining high, though not absolute, the tubercle bacilli will develop only under conditions most favorable for them. These conditions are: 1. The proximity of large collections of tubercle bacilli. Other things being equal extension will take place first from the largest focus in the body. 2. Extension will

occur in locations in which the tubercle bacilli are shielded from contact as far as may be with the antibodies which circulate in the blood—they will progress in relatively nonvascular regions. 3. They will seek locations in which they can multiply without being disturbed by motion, not only because rest is essential for a colony growing by supposition under the most difficult conditions, but because motion means function, and function is accompanied by vascularity.

Applying these laws to the extension of tuberculosis within the relatively immune lung we should find that tuberculosis begins in the hilus glands, that it spreads through the relatively nonvascular connective tissue of the framework of the lungs, avoiding the vascular parenchyma and being restricted to the perivascular and peribronchial structures. And even here in conditions of the highest resistance short of absolute immunity they will be able to propagate themselves only along the bronchi and blood vessels of parts of the lung of least motion—they will be restricted to the paravertebral portions of the lung and especially to the paravertebral region of the upper lobes. And it is this precisely that the X-ray shows. The resistance which absolutely prevents extension from the bronchial glands is apparently not common. In the majority of individuals who have had no clinical tuberculosis the X-ray shows extensions of tuberculosis as sharp lines with usually a few small dots, the process being confined to the deep lung. In many there is evidence of extension to the deep portions of the lower lobes near the spine, the existence of tuberculosis being probably shown by the presence of sharply outlined dots. From the rarity of lower lobe tuberculosis in the adult and the frequency with which it is met with in childhood it may be assumed that this process runs its course as a rule in early life.

In the adult, in whom the apices are better developed and the relative immobility of the upper lobes is greater than in the child, extensions occur chiefly into the paravertebral portions of the upper lobes. There are many cases in which clinical tuberculosis has never been demonstrated in which this process extends well up into the upper lobe, but does not reach the superficies of the lung. This fact sufficiently demonstrates the course of the disease. It must have been propagated from below upward, not as is often thought from above downward. For many the propagation of the tuberculous process in a centrifugal direction, that is, opposed to the normal lymph flow, presents difficulties. Here we take the position of Rieder, the well-known authority on the X-ray, who says: "Tubercle bacilli, like other germs, manifestly produce inflammatory thickening of lymph vessels. The consequence is a stenosis, perhaps finally a closure of these vessels, so that distally a stagnation of lymph and an extension of the infection can take place against the stream." (3) For further discussion of this phase of the subject lack of time compels a reference to the paper already referred to. In other cases the disease process reaches the superficies of the upper lobe, generally below rather than above the clavicle, and is shown to the

eye by calcified tubercles one or many, by pleural shadows, perhaps even by an obsolete cavity. In other cases with less immunity the process is not so closely confined to the paravertebral region, it extends not only upward but upward and outward. The loss of resistance permitting the tubercle bacilli to multiply in the more mobile portions of the lung, they are no longer restricted to a single or few channels, the lines of extension are numerous and radiate fanshaped from the hilus in the general direction of the shoulder joint. In the paravertebral extension upwards the tuberculous nature of the process is manifested by the presence of dots which represent tuberculous glands or parenchymatous foci. In cases of the highest resistance these dots or spots are least developed and the tuberculous nature of the affection is shown purely by the limitation of the lines to the paravertebral region. These are ceses of tuberculous peribronchial lymphangitis in the strict sense. What is generally called tuberculous peribronchitis is really tuberculous broncho-pneumonia limited to the vicinity of the bronchi and blood vessels. Here the parenchyma is invaded, but only in locations of least motion, i. e., immediately around the vessels aid air tubes, and if the process is active we have the mossy appearance described by authors, as it were a tree the branches of which have a soft irregular outline. When immunity fails still more the infection progresses to the involvement of the parenchyma on a wider scale and there is seen the confused picture of the pulmonary tuberculosis in the slightly resistant lung.

We have then the following subdivisions of tuberculosis of the deep lung:

1. Tuberculosis limited to the bronchial glands.

2. Tuberculosis capable of extension only in parts of least motion—paravertebrally upwards. In the highest immunity the process is strictly a tuberculous lymphangitis of the bronchi.

3. Tuberculosis extending upwards and outwards as well as directly upwards. The ability of the tubercle bacilli to maintain themselves in parts of greater mobility speaks for a lesser immunity, hence generally invasion of the parenchyma—a peribronchial broncho-pneumonia rather than a peribronchial lymphangitis—but cases are met with in which the disease is shown by the X-ray to be practically limited to the peribronchial lymphatics.

4. Tuberculosis extending peribronchially in all directions. Here, too, there may be abortive cases in which the disease is limited to the lymphatics. As a rule, however, the process quickly becomes a tuberculous broncho-pneumonia.

Lapses of immunity may lead at any time to pneumonic processes and confuse the picture. Typical tuberculosis of the upper lobe is a broncho-pneumonia developing upon a peribronchial lymphangitis of a paravertebral bronchus, the conditions in the upper part of the upper lobe being

especially favorable for invasion of the parenchyma because of the relative immobility of the part in the adult.

Among 984 chest plates of different patients at Fort Bayard, 394 showed paravertebral tuberculosis as a marked feature. Only 2 cases of strictly apical tuberculosis were found.

Eighty-two cases showed paravertebral tuberculosis alone (thickened lines with studding extending towards or to the apices).

Thirty-nine of the latter had not reached the apex.

Forty-five of the 82 cases of paravertebral tuberculosis gave no definite physical signs.

All of the 82 cases had at some time shown symptoms of tuberculosis, such as cough, expectoration, pleurisy pains, bleeding, loss of weight, fever, night sweats, malaise, etc.

All of the 82, with two exceptions, had at some time or other had a positive sputum.

Of 62 cases in incipient stage admitted since January 1, 1915, 37 had no physical signs; all had or had had symptoms; all except one had or had had a positive sputum; plates of all except two showed paravertebral tuberculosis above hiluses; of these two one had a basal pleurisy, the other a few scattered foci, some of which were in the outer part of the lung.

These figures give evidence conclusively of the importance of tuberculosis of the deep lung in the early history of pulmonary tuberculosis. The so-called incipient cases are not truly incipient, they are as a rule detected when the deep tuberculosis has begun to invade the superficial lung, when upon tuberculous lymphangitis or peribronchial broncho-pneumonia there has been engrafted a larger focus of broncho-pneumonia involving the cortical lung, the so-called primary lesion. Truly incipient tubercle gives no symptoms. Loss of weight, malaise, fever, cough and expectoration, hemoptysis, night sweats, are not symptoms of incipient but of advanced tuberculosis. Their development marks in a general way the progression of the disease from the benign lymphangitic stage to that of tuberculous broncho-pneumonia, whether this disease manifests itself in the form of numerous minute foci immediately surrounding the larger bronchi or of single or few larger foci in the superificial lung. Physical signs of the deep tuberculosis are absent or indefinite. The diagnosis depends almost entirely upon radiological examination. The X-ray also determines largely the prognosis which depends to a considerable degree upon the number, character, extent and distribution of the pathological shadows of the deep lung, not as evidence necessarily of present disease but as showing on the one hand to what degree of immunity the patient's organism has attained in the past, and on the other what and how serious lapses of immunity there have been, how widely the deep lung has been invaded by

the disease. From these data, remembering that for the most part they give the past history of the tuberculosis, we can determine what the possibilities of the future are. It should be borne in mind that in this discussion we are considering especially the tuberculosis of the relatively immune subject. The diagnosis and prognosis in the case of the patient with feeble resistance is only too easy and his X-ray plate is a palimpsest hard to interpret.

1. Zeitschr. f. tuberkulose, XVII, 3 1911, p. 217.
2. Muench. Med. Wochenschr. 26, July 1, 1913.
3. Deutsch. Archiv. f. Klin. Med. 95, 1908, p. 62.

RADIUM: ITS PROPERTIES, ACTION AND LOCAL APPLICATION AS A THERAPEUTIC AGENT.

BY

REX DUNCAN, M. D., Los Angeles, California

Attending Radium Therapeutist at The Los Angeles County Hospital. Attending Clinician in The Radium Clinic of The Graves Memorial Dispensary of The Los Angeles Medical Department of The University of California

In order that we may have a more comprehensive understanding of the action of radium and its local application as a therapeutic agent, it may not be amiss to consider briefly certain physical and chemical properties of this substance.

Radio-activity was discovered accidentally by H. Becquerel in 1896 as a property of uranium and uranium salts. He demonstrated that this metal had the property of spontaneously sending out energy in the form of rays capable of acting on photographic plates after passing through opaque bodies. He afterward found that this invisible radiation was capable of discharging electrified bodies, e. g. the electroscope; and Rutherford showed this to be due to the ionization of gases through which the rays pass.

In 1898 Mme. Curie and M. Schmidt discovereed, working independently of each other, similar rays in thorium. Taking this as a subject of a thesis for her Master's degree, Mme. Curie continued her investigations. In 1900, after long and skillfully conducted researches, Prof. P. and Mme. Curie were rewarded by the discovery of two new radio-active substances. One of these, of much lower activity, was called polonium to commemorate Mme. Curie's native land; the other was extremely active and was called radium. In the same year Dieberne isolated another substance, which he called actinium, but owing to its difficulty of extraction and short life is unable to be utilized at the present time. In 1904 Ramsey and Hahn discovered radio-thorium or mesothorium, and in 1906 Boltwood discovered ionium. These are the principal radio-active substances known at present.

Radium has been the substance used most in therapeutics, owing to its relatively possible isolation in the state of pure salts and its extreme radio-activity, which is 2,000,000 times greater than that of uranium, taken as a unit of measurement.

CHEMICAL AND PHYSICAL PROPERTIES OF RADIUM.

Radium (symbol Ra.) is a metal, atomic weight 226.5, belonging to the same group in the periodic table as calcium, barium, and strontium, which it resembles in its chemical reactions. It combines powerfully with the

halogens and acid radicals forming stable compounds which chemically resemble the salts of alkaline earths, but differing materially in that the radium salts possess the property of radio-activity. All its compounds are radio-active in proportion to the amount of radium element they contain.

Radium has been produced in its pure metallic state, but is of scientific interest only, owing to its rapid disintegration. The most common salts are the chlorids, bromids, carbonates and sulphates. The chlorids and bromids are soluble in water and the carbonates and sulphates are insoluble. All of the radium salts are independently luminous. They cause fluorescence in certain substances, e. g., diamond, willimite ore, barium-platinocyanide.

Heat is liberated spontaneously and continuously, one gram liberating 134 calories per hour. Some idea of the enormous amount of energy stored in radium may be gained when we consider that it has been calculated that if the energy could be employed in the same manner as coal, a quantity the size of a pin-head would be sufficient to light London for one year.

Radium renders air a good conductor of electricity by "ionizing" it, therefore it causes the discharge of a charged electroscope. The velocity of this discharge can be easily calculated and is in exact relation to the power of activity possessed by the salt. This is utilized as a very accurate means of comparison and measurement.

Radium undergoes disintegration in a constant, continuous and regular manner; its one-half life period being estimated at 1780 years. Helium, a gas, atomic weight 4; and emanation, a gas, atomic weight 222.5, are the first products of disintegration of radium. Emanation is the most important product of this disintegration, for from its decomposition results the formation of the active products known as "Radium A", "Radium B", "Radium C", "Radium D", "Radium E" and "Radium F". These active products also decompose, resulting in the radiations called alpha, beta and gamma rays.

For local application we may utilize either the emanation alone or the radium salts. The emanation may, with proper apparatus, be collected from radium salts in solution and retained in sealed glass containers. Its radio-activity rapidly diminishes, however, the one-half life period being only 3.85 days. The salts, when properly inclosed, as in hermetically sealed tubes, retain their radio-activity with the life of the salt.

ALPHA, BETA AND GAMMA RAYS.

The alpha rays are particles of matter, only one-fourth the size of the hydrogen atom, and are animated by a velocity of 1-10 to 1-20 of that of light. They are spontaneously charged with positive electricity and are slightly deflected by a magnet. They are absorbed readily, and of low penetration.

The beta rays are electrons, connecting links between matter and ether, spontaneously charged with negative electricity and deflected by a magnet. They form a heterogeneous group differing in their velocity and, consequently, their powers of penetration and are for practical purposes, arbitrarily divided into soft, medium, and hard rays. They are similar to cathode rays of the Crookes tube, but about 500 times more penetrating, having a velocity akin to light. By reason of their tenuity and velocity they have great powers of penetration and easily traverse substances. Sir William Ramsay stated that minute quantities of beta rays will be found after radiation through 5mm of lead. Besides the primary rays we have secondary beta rays, first described by M. Sagnac, which result from the action of gamma rays on encountering matter.

Gamma rays possess nothing of a material nature. They have been described as pulsations of ether of extremely short wave lengths, having a velocity presumably equal to that of light. They are not deflected by a magnet. They follow their own laws, and originate in a manner peculiar to themselves. Therefore, if there be any analogy between them and the phenomena due to the vibrations of ether, as the X-ray for example, there is no identity with them. This explains the absolutely, distinctive and peculiar character of the gamma rays. Their penetration is extreme, passing through as much as 10cm. of lead, and they are practically only annihilated by space.

APPLICATORS, SCREENS AND FILTERS.

For local application radium is usually supplied in hermetically sealed glass tubes containing the desired amount of the salt or in the form of flat applicators. The flat applicator may be round, oblong, oval or square, and consists of a metal back over one surface of which a certain quantity of the salt has been equally distributed and is held in place by a special varnish or other substance. The tubes have a much wider range of usage and where a sufficient quantity of radium is available they are to be preferred.

The effect of the rays upon the tissues depends to a considerable extent upon the quantity and quality of the rays employed. It may be desirable to diminish the total amount of radiation or to change the quality so as to alter the respective proportions of the alpha, beta and gamma rays. This may be accomplished by interposing between the applicator and the tissue various metals or other substances which are called screens or filters. Metals, (lead, brass, aluminum, silver, gold, platinum) screens, covered with rubber tissue to absorb the secondary rays, are most commonly employed. The filtration of the different rays by the screen is practically, though not exactly, in proportion to the density and thickness of the metal employed. The alpha rays are completely eliminated by a thin sheet of metal or glass and, in fact, rarely penetrate the walls of the apparatus or container. The heterogeneous character of the beta rays renders their

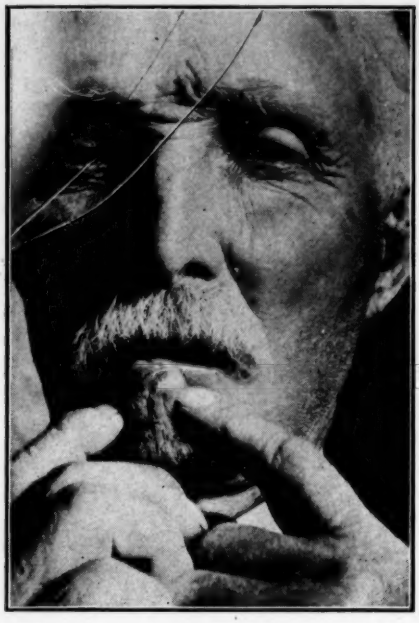


Fig. No. 2, Case No. 89. Epithelioma of lower lip.

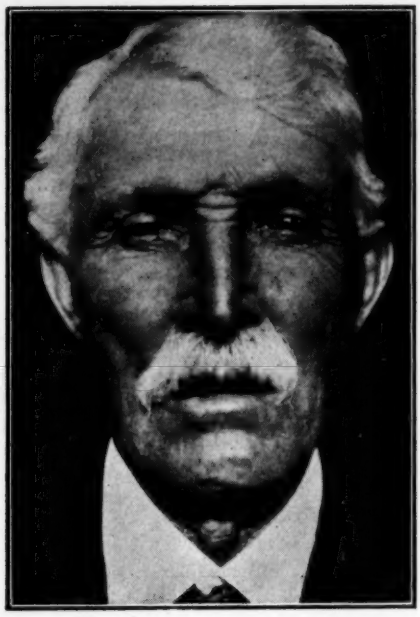


Fig. No. 3, Case No. 89. Six weeks following Radium treatment, apparent clinical cure. Note excellent cosmetic result.

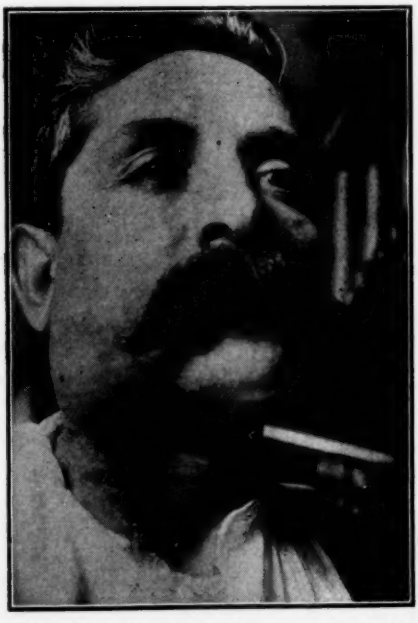


Fig. No. 4, Case No. 53. Lymphadenoma of the cervical glands. Recurrence two weeks following radical operation.

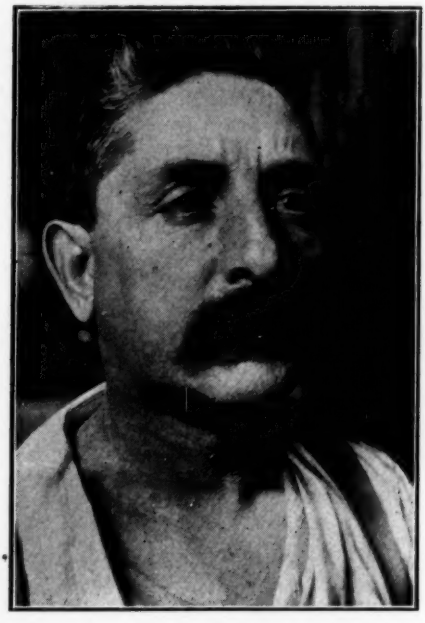


Fig. No. 5, Case No. 53. Three weeks following treatment with Radium.

filtration more complex, for while 0.5mm of lead will absorb the soft rays, they are not all eliminated by 5mm. of lead. The gamma rays cannot be eliminated and are always present when beta rays are employed.

It is thus evident that by the use of a series of metallic screens of different thickness it is possible to modify "ad infinitum" the value of the radiation, quantitatively and qualitatively. The distance intervening between the applicator and the tissue also acts as an important factor in modifying the therapeutic effect of the rays.

DOSE AND TECHNIQUE OF APPLICATION.

Success with any therapeutic agent necessarily depends upon a thorough understanding of the pathology of the condition to be treated and of the proper application of that agent. While a thorough knowledge of certain fundamentals is essential, there can be no fixed rules or dosage for the application of radium. As in other branches of medicine and surgery, the skill and judgment of the physician gained by study and experience will largely determine the results.

An accurate knowledge of the quantity of radium element employed is, of course, essential. In Europe, radium bromide is used as a standard of measurement; in this country, the radium element. Since the bromide contains only 53% of the element, we must make the necessary deduction when comparing quantities. Unfortunately, much of the radium salts purchased in Europe have, when submitted to the U. S. Bureau of Standards for measurement, been found to contain considerably less of the element than supposed. This has not only resulted in financial loss to the purchasers, but has been the cause of many disappointments in radium therapy.

I am employing in my work 100 milligrams of the element in the form of the sulphate. This is so divided that several cases may be treated at one time, or the entire quantity may be employed on the same patient. Rarely, however, is a single dose of over 100 milligrams required or less than 25 to 50 milligrams sufficient.

The therapeutic effect of a given quantity will be modified by the length of application, intervals between applications, screening, cross-fire, distance, etc. The same results cannot be obtained by the use of small quantities for a longer interval as would result from the action of sufficient dosage properly applied. It is possible by proper screening and suitable quantities to treat successfully deep seated conditions without injury to the intervening tissues. The small size of the applicators makes their introduction into cavities and tumor substances possible, where they may remain without discomfort.

HISTOLOGICAL ACTION OF THE RAYS.

The effect produced by the rays of radium upon the tissues will depend upon the histo-pathological characteristics of the tissue treated and the quantity and quality of the rays employed. Tissues differ in their susceptibility to the rays. Certain pathological tissues, namely, those that constitute keloid, angiomata and round cell sarcoma, are very susceptible and react in a way that may be appropriately termed specific. The reaction that follows radiation is essential for curative effect, but is not necessarily destructive. Disintegration and absorption of morbid tissues may occur without necrotic or inflammatory destruction and does not in any way resemble that produced by cautery, caustics, or similar agents. This reaction occurs after a latent period depending upon the dose employed and susceptibility of the tissues treated. Microscopical changes occur in a few hours or days, while two or three weeks may intervene before there are visible changes.

The histological changes that occur in malignant tissues vary considerably with the type of cell comprising the tumors.

The conclusions drawn by Teitschlaender,[1] of Vienna, after repeated pathological examinations of malignant tissue exposed to radium applications, are as follows: "The chief action seems to be the inhibition of karyokinesis and activation of leucocytes and destructive changes, allowing the abnormal tissues to degenerate."

In sarcoma the retrogression takes place according to the following law:

1. The size of the body and the nuclei of the large cells decrease.

2. As they shrink the neoplastic elements elongate, the shape of the nucleus becomes regular, and they eventually assume the form of large embryonic connective-tissue cells, forming into a cell mass similar to that of a true fibroma. Thus we may emphasize the fact that sarcoma is transformed by radium into tissue analogous to that of a fibroma with myxomatous changes.

As regards epitheliomata and carcinomata under the influence of the radium rays, we find that:

1. The cells gradually diminish in size and staining properties.

2. This atrophy corresponds, not to the metamorphosis of those definite formed elements, but to their destruction, as shown by keratinization or absorption.

The epitheliomatous cells disappear, either by means of progressive absorption of protoplasm and nuclei through the leucocytic infiltration or by a sort of granular degeneration.

The other processes associated with the development of every epithelial tumor are arrested, while vascular connective tissue is reorganized according to the method just described.

The endothelium of blood vessels is extremely sensitive to the rays and with moderate doses swells enormously and may obliterate the vessel, while large doses cause its destruction.

The effect on inflammation is to remove or diminish it, probably by stimulating the tissue to resist the action of bacteria and partially by the slightly germicidal action of the beta rays.

Dr. Danlos, physician to St. Luke's Hospital, Paris, in 1901 was the first to use radium, which was furnished him by Madam Curie. Soon afterward, Dr. Wickham began his work, which resulted in the establishment of the Laboratorie Biologique du Radium, Paris, whence invaluable research and clinical data have come. Dr. Abbe, in 1905, was the first to employ radium in this country, and has since contributed greatly to our knowledge of its application and value. Radium therapy has made great progress both at home and abroad, especially during the past four or five years. Time will not permit of a detailed account of the development of radium therapy.

Notwithstanding considerable opposition, radium has attained a definite place in therapeutics, both abroad and in this country. A very significant and pleasing thing has been its continued and constantly increased use by some of the most capable men throughout the world, and where sufficient quantities have been employed with proper technique in appropriate cases, the results have been most uniformly encouraging. The scope of this paper will not permit of complete case reports and statistics, but I wish to mention briefly some of the pathological conditions in which radium has proven of superior value as a therapeutic agent.

BENIGN CONDITIONS.

Papillomata of the skin respond very favorably to radium. Recent cicatrices, or scars, causing disfigurement or loss of function, may be markedly improved. One of my cases, a young lady, in which a large and disfiguring scar over the upper arm was completely replaced with soft, smooth and pliable fibrous tissue, which did not contract in the usual way, thereby resulting in a greatly improved appearance. Keloid is readily cured with radium and responds in a way that may be appropriately termed specific.

Flat, superficial naevi, capillary naeva, and port wine stains, especially if large, show very satisfactory improvement and many cures are effected where radium is employed with proper technique, though infinite patience and care are necessary. Cavernous naevi respond most favorably to radium and excellent cosmetic results are obtained.

Hairy moles, pigmented moles, etc., respond very favorably to the rays and, especially when large, the results are superior to those obtained by any other method of treatment.

Rhinophyma, which appears to be an overgrowth of the sebaceous glands of the nose, is readily influenced and the nose caused to resume almost a normal appearance.

I have had very favorable results in the treatment of several cases of tuberculosis of the skin, acne rosacea, and in one case of chronic seborrhic eczema which had proven resistant to all other treatment. Excellent results are also reported in the treatment of lupus-erythematosus, sycosis, and lichen planus.

Vernal conjunctivitis, (spring catarrah) respond very promptly to radium, and in several cases treated has not recurred.

In tubercular glands, where surgical measures have been declined, or because of possible injury to other structures, radium has caused the swelling to permanently disappear and recurrence in adjacent glands is not frequent. In the treatment of a tubercular parotid, as well as tubercular infection of the cervical glands, I have received most satisfactory results. In conjunction with other appropriate treatment, I have seen tubercular laryngitis very favorably influenced and excellent results are reported.

Angiomata, both deep and superficial, respond most favorably to radium. Lymphangiomata also respond most favorably.

Exophthalmic goiter was first treated by Abbe with marked reduction in the size of the gland and relief of the symptoms. Similar results have since been obtained by numerous observers and my personal experience with three cases has been most pleasing.

I have employed radium with perfect results in the treatment of fecal fistula following appendectomy, in two sinus cases, and in a persistent tubercular sinus following resection of the knee joint. Some work that I am now doing will be reported later in detail.

With the exception, perhaps, of malignant conditions, radium has proven its greatest value in the treatment of uterine myomata. A sufficiently large number of cases have been treated by a number of men, working independently, to establish its value in the treatment of this condition. Menorrhagia and metrorrhagia are promptly relieved and the tumor greatly reduced in size or caused to disappear in over 90% of the cases reported. Radium should be the method of choice in the treatment of uncomplicated cases.

Kelly & Burnam,[2] Abbe,[3] Ranshoff,[4] and others report most excellent results from the treatment of this condition. Menorrhagia and metrorrhagia of obscure etiology are favorably influenced in a large per centage of cases. My personal experience in the treatment of these conditions, as well as uterine myomata, has been most gratifying.

Enlarged and hypertrophied prostates of old men have been favorably influenced. Radium offers a safe and convenient method of treatment, the results of which in no way complicate a future operation should surgery become necessary.

MALIGNANT DISEASES.

Clinical results have unquestionably demonstrated the value of radium when properly employed in the treatment of malignant disease; here radium may be used as follows:

First. Before operation either to render the condition operable or lessen the possibility of recurrence.

Secondly: Post-operatively, radium should with few exceptions be used as a routine measure in the treatment of malignant conditions. In most instances the treatment should be applied immediately following the operation. Because of the small size of the applicators, they may be applied through a small drainage tube and left for the desired time, when the tube and radium may be removed, permitting of primary healing of the wound.

Thirdly: In the treatment of recurrent and inoperable cases, no other agent or combined treatment has yielded the results obtained by the proper application of sufficient quantities of radium.

Fourthly: There are some malignant conditions, especially superficial epitheliomata and certain types of sarcoma, which can be more favorably influenced by radium alone than by surgery or any other method of treatment.

Superficial epitheliomata, of the squamous cell type, can be cured in practically every case where metastasis or glandular involvement has not occurred. I have treated a large number of these cases, some where very extensive destruction has occurred, with an apparent clinical cure in every case. The cosmetic result is truly remarkable. Epitheliomata of the lip, (figures 2 and 3) when glandular involvement is absent, may be permanently cured in practically all cases, and not infrequently, with appropriate treatment, can the glandular deposits be caused to disappear. In epitheliomata of the floor of the mouth, mucous membrane, tonsils, fauces, palate, larynx, pharynx and esophagus, treatment may be adopted with a good prospect of giving relief and not infrequently does complete absorption occur.

Advanced and inoperable carcinoma of the breast and elsewhere may be temporarily relieved and a surprisingly large number of cures have been reported.

As a palliative in the treatment of inoperable and recurrent carcinoma of the uterus, radium has no equal. Pain is relieved, hemorrhage arrested and the odorous discharge stopped in practically all cases. I have seen prompt and complete absorption of the malignant tissue, and the disap-

pearance of all signs of symptoms in a large number of cases treated. Schmidt,[5] Kelly & Burnam,[6] and others who have treated a large number of these cases report of those under observation for from one to five years over twenty-five per cent of clinical cures.

Young reports very favorably on the use of radium in malignant conditions of the bladder and prostate. Two cases of primary carcinoma of the female urethra that I have treated, are apparently clinically cured. Carcinoma of the bladder may be favorably influenced. The radium may be applied through an operating cystoscope directly into the tumor substance where it may remain for the desired length of time. In one of my cases treated by this method, the tumor has entirely disappeared and there is no evidence of recurrence.

Time will not permit me to discuss as fully as I should like the use of radium in the treatment of sarcoma. As previously mentioned, certain types of round cell sarcoma respond most favorably to radium radiation, and I have seen immense tumors rapidly absorbed with but slight constitutional disturbance. In several cases of sarcoma, both primary and recurrent conditions, I have received very favorable results.

In the treatment of lymphadenoma and lymphosarcoma, better results are frequently obtained by the use of radium than by any other treatment, inasmuch as recurrence is most common following attempted surgical removal. In a case of lymphosarcoma of the cervical glands, in which one week following operation, breaking down of the tissues, immediate relief and apparently a clinical cure was obtained by the use of radium. In another case (Figs. 4 and 5) of lymphadenoma involving the cervical glands, in which there was extensive recurrence two weeks following operation, I not only succeeded in arresting the condition but in causing absorption of themalignant tissue and an apparent clinical cure.

In closing I wish to emphasize the fact that radium has a comparatively limited field as a therapeutic agent; however it is a very valuable agent in properly selected cases. Special training and experience are essential to the proper application of radium and it should only be employed under the direct observation of those properly qualified.

805 I. N. Van Nuys Bldg.

BIBLIOGRAPHY.

1. Teitslander Monatschr. f. Geburtsh. u. Gynak. 1913, XXXVIII-296.
2. Kelly & Burnam, Journal of A. M. A. 1914, XXIII-622.
3. Abbe, Robt. Medical Record, Mar. 6, 1915.
4. Ransohoff, J. L. Lancet-Clinic. Vol. CXV No. 6 Febr. 1916.
5. Schmidt, H. Surg. Gyn. & Obst. Vol. XXXIII No. 2 Aug. 1916.
6. Kelly & Burnam, Jour. Am. Med. Assn. Vol. LXI No. 22 p. 1874.

TYPHUS FEVER.

BY
FRANCIS H. REDEWELL, B. S., M. D., Phoenix, Arizona
(Read before the Maricopa County, Arizona, Medical Society, March 10th, 1917.)

The word typhus is derived from the Greek meaning fog or mist. The term came into vogue at a time when the disease was imperfectly understood, and was used by Hipprocrates thus describing the "stupor" state of patients suffering from that particular type of fever. It belongs to an entirely different group of infectious diseases from typhoid, namely, the acute exanthemata which it resembles in the extraordinary ease with which it is transmitted, by its self limited course, by the rare occurrence of relapses, by the peculiar character of the temperature curve, and also because the eruption appears at once instead of in successive patches.

SYNONYMS.

Some of the one hundred synonyms for typhus fever are: Spotted typhus, exanthematic typhus, typhus contagiosus, febris pestilens, febris petrida, febris petechialis, typhus carcerum, (jail fever), febris castrensis (camp fever), febris nautica (ship fever), hunger typhus, and febris Hungarica (Hungarian fever).

HISTORY.

Typhus fever is one of the diseases that was probably known to antiquity. Hippocrates, Aetius, Rhazes, and Avicenna give exact description of the disease in their writings. The earliest unmistakable reports were those of Jacobus de Partibus, 1463, but even at this time it was confounded with plague, typhoid, erysipelas, scarlet fever and relapsing fever. The pest of Cyprus 1505-28 which ravaged the whole of Italy was typhus; the morbus Hungaricus of 1552 in the army of Charles the Fifth at the siege of Metz, the plague in Hungary 1566, the plague in Denmark 1613-52, that of Vienna 1757 and '59, and in the German Provinces 1771 and '72—all those epidemics were contagious typhus. Typhus fever has always followed in the wake of armies. It claimed more victims than weapons did in the thirty years war, and was the great scourge of the Napoleonic campaigns and decimated the French army in the terrible retreat from Moscow. Hildebrand's monograph thoroughly covers the typhus epidemics through the whole of Europe in the 18th and 19th centuries. Since 1830 the disease has always been prevalent in Ireland and England. In Ireland alone an eighth part of the population was affected, while in Dublin every third person had the disease. Over 40,000 deaths were recorded. Murchison states that in 1847 there were one million cases in England and

300,000 in Ireland. Osler mentions the fact that during a period of twenty-five years in Ireland, among 1,230 physicians attached to institutions 550 died of this disease. During the Turko-Russian war of 1878 the sanitary conditions in the Russian army must have been appalling. Of 200,000 patients, at least half were afflicted with typhus and half of these succumbed. The surgeons were the worse sufferers, the mortality among them reaching 60%. Typhus fever was confused with other diseases, especially relapsing fever and typhoid. The distinction was clearly drawn between typhus and the former in Ireland about 1826 and the nonidentity was conclusively settled by the discovery of the spirillum of relapsing fever in 1868. Gerhard was the first to set forth clearly in 1837 the pathological differences between typhus and typhoid fevers and the discovery of the typhoid bacillus by Eberth in 1880 definitely established this distinction.

Since 1880 in Germany typhus has been an endemic disease and is fed constantly from neighboring Polish provinces of Russia and at intervals spreads over the entire country. France was also invaded about that time with the disease when there was an epidemic in Lille from which city it spread to the prisons of Paris and other cities.

At the beginning of the present war typhus was a terrible scourge, especially for the first year and a half, before modern sanitation held sway especially in Belgium, Serbia, the Balkans and Russia. Nicolle reported 838 cases in Tunis; three years later after efforts to control the disease in the light of recent researches that had been put into effect, there occurred only 22 cases. In the Balkans and Russia it is estimated that there were over two million cases of typhus with an exceedingly high mortality. Now the modern Russian army, clean shaven, better clothed and with modern sanitation, has reduced the number of typhus cases to a minimum and the Balkans are making headway against the disease with aid of the Red Cross, and Red Crescent; yet numerous cases break out in the prison camps, in the trenches and in remote districts.

In the western hemisphere, the United States has been rich in the visitation of typhus, but how many cases this country has had and for how long a time the disease has been lurking, especially in the larger cities, no one knows and probably no one ever will know. Of course immigrants have brought the disease to our quarantine stations at ports of entry to this country, and the disease was accurately diagnosed at those hospitals, but how about the thousands of the endemic type of typhus scattered all over the states which were not accurately diagnosed until Dr. Nathan E. Brill had published his three papers in 1909 and 1910? These are very interesting reading.

Dr. Brill in those three papers reported 272 cases of a peculiar fever observed by him in the wards of the Mt. Sinai Hospital which type of disease was immediately known to the profession at large as Brill's dis-

ease though not immediately indentified as typhus, and described by him as "an acute infectious disease of unknown origin and unknown pathology, characterized by a short incubation period, a period of continuous fever, accompanied by intense headache, apathy, and prostration, a profuse and extensive erythematous macula papular eruption, all of about two weeks duration, whereupon the fever abruptly ceases either by crisis in a few hours, or by rapid lysis within three days, when all symptoms disappear." Up to that time it was believed that cases of typhus did not occur in this country except at rare intervals. It happened that Drs. Goldberger and Anderson of the Public Health Service who had just returned from Mexico, where they were studying typhus fever, were struck with the similarity of this so called Brill's disease and typhus. They finally saw a case in the Mt. Sinai hospital, drew blood from the patient's arm, injected the blood into a number of monkeys and ten days thereafter one monkey developed a fever which reached its maximum in six days and fell by rapid crisis fourteen days after the rise began. They ran this stain of virus through 76 generations of monkeys and 150 generations of guinea pigs. Finally they proved absolutely that this Brill's disease was typhus by cross immunization thus: It was found that an attack of Brill's disease in the monkey conferred a definite immunity to infection with Mexican typhus, and that an attack of Mexican typhus in the monkey conferred a definite immunity to an attack of Brill's disease.

The wonderful disclosure that Brill's disease was really typhus stimulated the searching of hospital records throughout the country by resident house officers and other interested physicians, and as a result cases have been reported from other hospitals in New York City, Chicago, Milwaukee, Washington, Atlanta, Providence, Boston and points in Virginia and Indiana. For instance, Roger Lee, in study of case records of the Massachusetts General hospital for ten years, 1902-1912, concluded that typhus fever had been present in Boston and vicinity for that time. Of 1,404 cases of continued fever of a greater duration than seven days, 28 corresponded very closely with Brill's description of typhus. This gave a ratio of 1 case of Typhus to 47 of Typhoid. Carrying out this same ratio for the year 1912, there must have been 72 cases in New York City, 22 in Baltimore, 10 in Boston, 22 in Chicago, and 34 in Philadelphia. From this it is evident that typhus, instead of having disappeared from the United States, is present and has been present for years, at least in large cities.

In Mexico, the Central Republics and South America the disease prevails in the severe epidemic form and has been there for centuries. From the time of the siege of Granada, when the Castilian army under Ferdinand was decimated by a fever called "el tavardillo"—"the cloak," the Spanish and Mexican literature has constantly described the ravages of typhus. The present literature calls it "tavardillo." According to Indian hieroglyphics translated by Spanish authors and studied by Libermann, the

disease reigned at the time of the Aztec Empire under the name of "masahuathl" and in the last century terrific epidemics occurred in Mexico City. In 1893 there were 3,000 deaths in the federal district in a population of 350,000. Every year a toll of several hundred lives is exacted by the disease. Olitsky, Denzer and Husk did work in Matehuala, Mexico, population 10,000, where, as well as elsewhere in Mexico, the extent of the epidemic was difficult to determine on account of absence of vital statistics, but from reports of individuals and official papers it was estimated that there were 30,000 cases, or 10% of the population in Mexico City alone, 500 cases in Metehuala during the dry season.

ETIOLOGY.

Nicolle, Comte, and Conseil were the first to demonstrate insect transmission of typhus fever. In September, 1909 they reported the successful transmission of typhus from one Bonnett monkey to two others by means of body louse (Pediculus vestimenti). In this paper they showed that body lice that had fed on an infected monkey were able to convey typhus fever some time between the first and seventh day thereafter. In February 1910, Anderson and Goldberger reported a successful attempt to transmit the disease from a human patient to a monkey by the bite of body lice. Then they made extensive experiments with the head louse, clipping the heads of typhus patients in the general hospital at Mexico City, crushing these lice and injecting the watery extracts into monkeys and finally concluded in their Government Report of 1912 that the head louse (Pediculus capitis) can also transmit the disease by its bite. Numerous investigators attempted by experiments to transmit typhus with other common insects such as the flea, mosquito, etc., with negative results.

For fifty years the medical literature has been replete with articles by experimenters claiming to have discovered the germ of typhus describing cocci, bacilli, spirilla and protozoa; and one very industrious and conscientious observer, Rabinowitsch, wrote seven articles between 1909 and 1914 reporting extensive experiments, but it finally remained for Harry Plotz, in 1914, to be the real discoverer, which work has since been corroborated by such men as Olitsky, Baehr, Denzer, Husk, Anderson and Goldberger. At the suggestion of William H. Welch this typhus organism was called Bacillus typhi exanthematici which was the name given the causative factor of this disease by Klebs in 1881 to a hypothetical organism. The name was never actually used previous to Plotz's work because the earlier search for the organism proved futile. The organism, a bacillus, was recovered from the blood of five cases of European epidemic and six cases of mild epidemic in New York City. Since that time Plotz has recovered the bacillus from over 300 human cases.

MORPHOLOGY OF ORGANISM:

The organism is a small, pelomorphic bacillus, not motile, not encapsulated, and not acid fast. Its length varies from .9 to 1.9 microns, its breadth being from one-fifth to three-fifths its length. Most of the organisms are straight; occasional ones are slightly curved. Coccoid ones also occur. The ends are rounded and slightly pointed, while in smears the organisms are seen end to end, side by side, and at all angles, there being no definite arrangement. Plotz lays his success in discovering the bacillus from the fact that practically all the former observers studied and searched for aerobic organisms while Plotz worked for anerobic bacteria and was successful. The bacillus grows best in acetic fluid containing a little kidney tissue and the mixture covered with liquid petrolatum, it also grows well in 2% glucose agar and glucose broth and glucose serum agar. On the latter in three days a creamy white growth is observed, while cultures in Buchner tubes have no tendency to spread over the surface, but rather to heap up. After five days the growth is more profuse and precipitation more marked. In ordinary culture tubes the growth never rises higher than 2½ cm. from the top. The growths are so faint and pale at first that they can best be seen by transmitted light. It is found by the observers that there are from ten to twenty times the organisms in the blood of sufferers from the epidemic form compared to that of the endemic form, and that relatively large quantities of blood must be drawn from endemic cases to obtain cultures; and that lice must live on their hosts a far longer time in the endemic cases to become infected than in the epidemic cases; also when lice did receive typhus germs in their body it required four to five days of incubation in their bodies to render these lice infective to other hosts. Olitsky, Denzer and Husk showed that infected louse cultures were invariably gram negative but the gram negative bacilli became gram positive on sub-culture. These observers also showed the presence of complement fixation bodies, precipitins, opsonins and agglutinins. They also state that 16% of the cases showed positive agglutinations before the crisis and 95% after the crisis. Another point brought out is that the virulence deteriorates very rapidly in cultures, also that antibodies against this bacillus demonstrated by the late Dale method are found in the serum after the crisis and are not demonstrable at the height of the disease.

IMMUNITY.

We have not the space here to describe the experiments determining the immunization of animals to the disease as recorded by the various observers but will sum up their reports by saying that whether a human has the endemic or epidemic form it immunizes him against any further attack; also that certain observers who worked with the infected lice and later tried to produce the disease in themselves by bites of the infected body-lice found themselves to be immunized to typhus. As to whether artifi-

cial immunity can be produced to be used in a commercial way, I will quote from one observer what he actually said to the El Paso County Medical Society last February: "I am the only living representative that I know of that has had four doses of the vaccine. I took two of them in New York, one in Chicago and one since I got here. It makes your arms sore, but it does not give anything like the reaction that typhoid inoculation does; only malaise." He died one month later from infection of typhus at Laredo, Texas, while another worker with him had not received the vaccine and contracted typhus, got well. He was Dr. Carlos E. Husk. There have been further works on immunity and a fine article on that subject will come out in a future number of the Journal of Infectious Diseases. At present the only logical type of immunity as we see it is to get some of those endemic typhus infected lice of New York, infect yourself with them and thus contract the endemic form of the disease, which is a mild form and from which the mortality is very low, yet, on recovery, as far as we can learn in the literature, one is immunized for all time to come against another attack of typhus whether endemic or epidemic. As mentioned above a small percentage of doctors and nurses working in hospitals with typhus cases acquire a natural immunity.

MORBID ANATOMY.

One of the most peculiar and interesting things about typhus is that there is no specific pathological lesion in any organ of the body. The disease is a bacteremia and the changes are those which result from intense fever. The blood is dark and fluid, the muscles are of a deep red color and often show a granular degeneration, particularly in the heart; the liver is large and soft and may have a dull clay-like lustre; the kidneys are swollen; the moderate enlargement of the spleen and a general hyperplasia of the lymph follicles. Payer's glands are not ulcerated. Bronchial catarrh is usual, and hypostatic congestion of the lungs often present. The skin shows the petechial rash.

SYMPTOMS.

One of the striking features of the epidemics of typhus is the direct relation of the location of the disease in the different continents to the severity of the attacks. Olitsky divides the disease into four classes, according to severity:

1. Mildest, the endemic typhus cases in New York (Brill's disease.)

2. Next severe, the epidemic typhus cases in Bulgaria and Russia, 1915-16.

3. Still more severe, the epidemic typhus cases in Mexico.

4. Severest, the epidemic typhus occurring in immigrants from the Balkans. The average mortality of these classes is No. 1, ½ to 1%, No. 2, 10%, No. 3, 20%, No. 4, 50%.

INCUBATION.

Eight to 12 days. As a rule invasion is abrupt with chills or a single rigor and fever. There is headache and pains in back and legs. There is early prostration and the fever attains its height in second or third day. The pulse is full and rapid, but not so frequently dicrotic as typhoid. Vomiting may be distressing, the eyes dull and congested. In severe cases mental symptoms are present, from a mild febrile delirium to an excited, active almost maniacal condition.

STAGE OF THE ERUPTION.

The eruption first appears on the abdomen and upper chest on the third to fifth day, and in two days more it is all out. Buchanan describes it best as a fine dusky red mottling, as if below the surface of the skin some little distance and seen through the semi-opaque medium; another feature is the rose spots that change to petechia, upon which pressure produces no effect. In children the rash resembles measles, and gives a mottled appearance to the skin called mulberry rash. In mild cases the rash is petechial in character. During the second week the symptoms are more aggravated, expressionless face, flushed cheeks, injected conjunctivae, pinpoint pupils. Retention of urine is common, coma vigil is frequent, the patient lying with open eyes but quite unconscious, heart action becomes more enfeebled and death takes place from exhaustion. In favorable cases, at end of second week comes the crisis—often after a deep sleep the patient wakes feeling much better. Convalescence is rapid and relapse rare. The fever maximum is reached on the fifth day with temperature from 105 to 107 degrees and continues with slight morning remissions till the fourteenth day. Just before a fatal ending the fever may rise to 108 or 109 degrees. Mild cases seldom rise above 103 degrees. The typhus siderans is the malignant type, which proves fatal in two to four days.

COMPLICATIONS.

Broncho-pneumonia is perhaps the most common complication and may result in gangrene of the lung. Also gangrene of the hands, toes and nose may occur. Paralysis is more common. Meningitis is rare. Septic processes, such as parotitis and abscesses in the subcutaneous tissues and in the joints are occasionally met with.

PROGNOSIS.

As mentioned above, in the mild cases the mortality is very low, while in the severe type it may reach as high as 50%. The disease terminates very favorably in children but becomes very grave in old people.

DIAGNOSIS.

In epidemics it is easy to diagnose but in sporadic cases it is extremely difficult, for as Osler says: "It is easy to put down on paper elaborate differential distinctions, which are practically useless at the bedside."

The Widal reactions and blood cultures are important aids and especially the agglutination with the typhus bacillus. There may be a slight lucocytosis in typhus, and that together with the abrupt onset, the two types of rash starting the third day, the extreme nervous symptoms in the second week and termination by crisis all help to clinch the diagnosis."

PROPHYLAXIS

Hirsch says that the "history of typhus is the history of human wretchedness." Do away with lice and you will have no typhus. Lice are killed by heating to 70°C (158° F.)

INSTRUCTION TO DOCTORS REGARDING "TYPHUS."

(Taken from Husk.)

"Wear silk underclothes including sox. Lice are loath to crawl over or take up quarters on a person wearing silk. Very important.

"Clean head and hairy parts of body by using a solution equal parts kerosene and vinegar. Kerosene kills lice, vinegar kills nits. Wrap up affected parts after rubbing thoroughly with this mixture for one hour only—longer use will scald. Wash off twelve hours later with carbolic or tar soap. Repeat operation in twenty-four hours, to be sure none have escaped first treatment.

"Wash or spray all infected quarters with solution of kerosene and hot soap-suds equal parts.

"Boil all infected clothing and bedding.

"Have manta or linen suit made to cover your entire body to neck. This can be done by lying down on a piece of cloth, marking out your outline. Doubling this pattern, sew sides together, put a gathering or puckering string at neck of top. This suit should include legs and feet and arms down to wrists. Paste strip of adhesive around open ends of wrists and use rubber gloves on hands. Over this suit put on boots, rubber preferred, paint a band around these at ankles with crude oil to prevent lice crawling up from floor.

"Sprinkle powdered creolin around your neck and waistband or use a cloth saturated with kerosene and vinegar solution.

"Be careful of your head contact, as this is the only unprotected part.

"Either boil these clothes after visits on returning from infected places or place same in closed box, in which a small can of chloroform is emptied, and after twelve hours all inhabitants are killed.

"Use plenty of kerosene mixed with vinegar; it's the best preventative.

"Carry out extensive bathing, spraying and cleanliness with your workmen, families and quarters.

"All you have to do is to kill all lice in your camp.

"Be energetic and use all measures to gain this end."

In the instruction to doctors mentioned above you will notice that the solutions advised when mixed ready for use are not inflammable, which is an important point. Kerosene, gasoline, benzine or turpentine are good agents, but you may fumigate the city by burning it to the ground before the lice are eradicated. For that reason dichlorethylene and tetrachlorethane are better; as also are vinegar mixed with kerosene. The common phenol disinfectants will not kill lice even after steeping thirty minutes. The volatile oils have no effect. In the Serbian campaign a union suit extending from the toes to the neck with attached gloves was worn next to the skin. This was covered with customary hospital gown and shoes. The hair was clipped short. A surgeon's cap and mask completed the outfit. The outer garments should be removed while standing on a sheet—the whole then wrapped up and sent to be steamed, boiled, baked, or dipped in gasoline.

TREATMENT.

Elimination and hydrotherapy are the two most important routine measures to follow. The Murphy drip is used with considerable success. Lavage for temperature above 102 1-2 is very important in reducing the nervous manifestations. Specific medication is not recommended; antipyretics are dangerous, because they make the heart weakness more pronounced. As a result of the serology of this disease mentioned above, there is no question but that a vaccine will be forthcoming soon which will be available for all to use, but till then, let us depend for safety on rigid prophylaxis.

120 N. 1st. Ave.

THREE CASES OF BRAIN TUMOR

BY

E. B. ROGERS, M. D., El Paso, Texas

(Read before the El Paso County Medical Society, March 19th, 1917.)

It is usually considered that in order to make a diagnosis of tumor of the brain one should be able to demonstrate the presence of several of the more prominent general symptoms or signs, such as headache, nausea, vomiting, dizziness, convulsions, respiratory and cardiac phenomena, optic nerve changes, metabolic disturbances and mental signs with sleeplessness.

In order to indicate how varying these may be, I desire to report three cases of brain tumor with comments on their localization.

CASE 1—TUMOR OF THE PONS.

Mr. S. 28 years old, married. In April, 1916, he consulted Dr. E. H. Irvin in the belief that he needed glasses. The eye findings at that time showed only a muscular unbalance—heterophoria.

General physical examination in June was negative, except the tendon reflexes, which were exaggerated. There were some indefinite symptoms such as restlessness, unconscious periods of short duration and insomnia. The Wassermann gave a plus-minus result. Antiluetic treatment for a month improved the eye condition. During the same time the restlessness and insomnia increased. Treatment was discontinued and he left the city for a month's rest.

Upon his return there was found a marked increase in the nervousness, insomnia and general restlessness. While lying on a couch awaiting examination he would apparently sleep for a few seconds, then jump suddenly, turn over, and jerk his head, arms and legs. Short periods of rest would be followed by renewed demonstrations. At times there were sharp muscular twitchings, simulating chorea. He acquired a peculiar habit of pulling his ears, apparently unconsciously, during his restless spells, and if he was permitted to indulge himself in the habit it seemed to quiet his restlessness. His mental condition at times was poor, at others normal. During the periods of nervousness he could scarcely concentrate on a subject long enough to answer questions intelligently. Several years previous, multiple small tumors had developed in the skin which were later shown to be neurofibromata (Recklinghausen's disease).

This condition kept up for weeks, during which time he was under the care of Dr. J. M. Richmond. The restlessness became extreme and was uncontrollable by opiates. Paraldehyd was the only drug that had any effect in overcoming the insomnia. The habit of pulling his ears became so extreme that they were partially pulled off; his head had

Case III. Sella as seen in stereoscope outlined by dots.—Dr. Rogers.

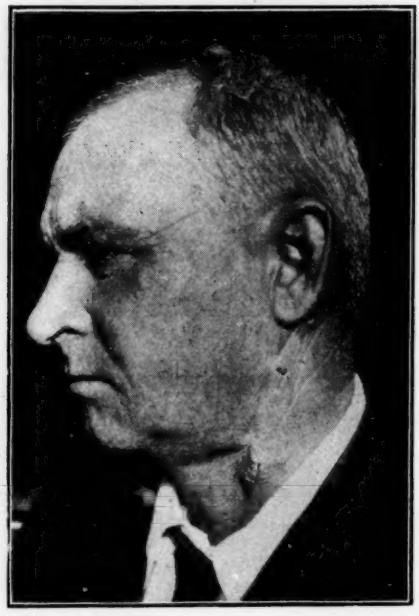


Fig. No. 1, Case No. 63. Breaking down of wound and recurrence two weeks following radical operation for Lymphosarcoma cervical g l a n d s. Healed promptly and apparent clinical cure following use of Radium.

to be encased in a plaster paris helmet, and his hands strapped. The restlessness produced muscular hypertrophy and his muscles became as hard as those of an athlete. The spinal fluid was negative. At one time there was a beginning choked disk in the left eye, no other localizing sign developed. He died after a short coma.

The post mortem showed a single glioma of the pons which "largely obstructed the iter and produced an internal hydrocephalus." (Cushing.)

CORRELATION OF SYMPTOMS WITH PATHOLOGY.

This is a case marked by the intensity and peculiarity of its symptoms, and an almost complete absence of localizing signs. It is also peculiar in its absence of general symptoms. Headache, that most constant symptom of brain tumor, was present only once and then but for a day. Convulsions, nausea and vomiting were also absent. The tumor in its growth caused obstruction to the aqueduct of Sylvius, thus producing an internal hydrocephalus, since the greater fluid production comes from the ventricles above. The peculiarities of the case no doubt arise from the fact that the symptoms of local irritation outweighed those of pressure caused by a relatively small tumor. The pontine syndrome produced by a tumor in the anterior portion of the pons and cerebellar peduncles would be composed chiefly of choreoathetoid movements and irritation of the nuclei of the oculomotor nerves. This would account for the restlessness and the heterophoria. The absence of anesthesias and paralyses over the body would mean that the longitudinal nerve tracts were not seriously involved. The habit of pulling his ears so vigorously, apparently without pain, may have been due to analgesia from interference with the sensory tracts of the fifth nerve, though the ears were not anesthetic to touch.

With an absence of headache, convulsions, nausea and vomiting one cannot believe that the aqueduct of Sylvius was fully closed or that the hydrocephalus was marked.

Recalling the fact that the spinal fluid came away without pressure, one can easily believe that this was a dangerous case for spinal puncture. It is in cases of tumor of the hind brain where the fluid is cut off from above that most of the sudden deaths have occurred.

Such tumors are inaccessible to operation and are not favorable for decompression since this would only give additional space for the development of hydrocephalus. The outlook is hopeless from the beginning.

CASE II—TUMOR OF THE LEFT ROLANDIC AREA

Mr. H. age 38, freight conductor, family history negative.

History. The patient had an injury to his head seven years ago by being squeezed between two box cars. He did not lose consciousness and no physician was consulted. The right shoulder and right side of chest were contused at the same time. Four years ago he had an attack of gall-bladder colic, three years ago an attack of left renal colic. The urine contained albumin and pus. For the past six years at inter-

vals of about six months, he has had a chill, followed by fever, headache, nervousness, and sometimes nausea and vomiting.

Present trouble. On May 1st, 1915, he had a convulsion while on his train, and was sent to the hospital here. It followed a chill and he had a temperature up to 101 degrees for several days. A second convulsion followed a chill on May 15th. The urine contained albumin and pus. Cultures gave a pure growth of B. coli. The ureters were catheterized once in June, twice in July, and once in August, and the kidney pelvis irrigated with solution of silver nitrate. An autogenous vaccine was prepared and used in the meantime. Severe convulsions occurred August 31st and September 1st. In October the irrigations were continued at weekly intervals. The urine would clear temporarily and cloud again within two weeks. He continued to work part of the time, but during this period he noticed that he had to pay unusual attention to his train orders that he might not forget them.

Another convulsion occurred November 10th. On December 2nd another convulsion seized him at 5 a. m., as he was entering the house from work. This one began a series that lasted two weeks, two to six convulsions daily, consciousness being lost only in the more severe ones. There was no fever, but the pulse went as low as 48. There were headaches, vertigo and vomiting. The left eye showed a beginning choked disk. Serum Wassermann negative, luetin test strongly positive. Spinal puncture gave a clear fluid under increased pressure. This fluid gave a negative Wassermann, globulin plus and cell count 6.

So much relief came from the spinal puncture that it was repeated in a week, but this time his discomfort was increased. Diagnosis of brain tumor was now made.

At the times of the severe convulsions, he had considerable impairment of his mental faculties, especially memory and power of concentration. Otherwise, psychic disturbances have not held any marked position in the symptomatology.

In January, 1916, he went to the Mayo clinic at Rochester, where a diagnosis of epilepsy was made, and he was sent back to us with a prescription for bromides. After his return, on the strength of the luetin and globulin tests he was given a series of eight intravenous injections of salvarsan, together with mercury and K I. During this time his general condition improved somewhat and the severity of the convulsions diminished. A remarkable coincidence was that the urine cleared of pus and bacteria, and there has been no recurrence.

About this time he had a convulsion under observation in my office. It began with rotation of the head and eyes upward and to the right, then clonic contractions of the muscles of the right side of face; later the neck and finally the right shoulder and arm. He did not lose consciousness, but was unable to speak. The convulsions are always preceded by an aura, a peculiar feeling by means of which the patient realizes an impending seizure. If he is standing up he sits down, and always holds his lower lip to prevent its being bitten. At times he will have

someone hold his head to resist the movements of rotation which cause much soreness of the neck muscles. Following the convulsions there are paranesthesias in the areas involved, which sometimes extend into the right leg and foot. From this I localized the tumor near the Rolandic area of the left side, probably in the frontal lobe as he had no signs of parietal involvement. About the last of April X-ray pictures were made in one of the laboratories of the city, from which was made a diagnosis of depressed fracture of the vault. In spite of protests, an operation (April 29th, 1916) was necessary to show him the error of his diagnosis.

He went to St. Louis, May 30th, where a diagnosis of epilepsy following injury was made. He went on to Baltimore and was operated upon, July 7th, by Dr. W. E. Dandy in Johns Hopkins Hospital. I quote from the hospital report, following their description of the incision, as follows:

"The dura was noted to be moderately tense, but not especially so. A flap of dura was cut and turned down in the usual way exposing a fairly large area of the cortex. Two striking pathological conditions presented themselves very readily. One was a very definite infiltrating glioma, involving the upper Rolandic area. This growth seemed to extend more in the pre-Rolandic area than in the post, but it seemed to a certain extent to involve both. The area of definite surface involvement was as large as a half dollar, perhaps a little larger. In this area the brain appeared to be quite whitish, compared with the normal looking brain about. On palpation it was considerably firmer. There was also a striking lack of vascularity due apparently to a pressure in this area or in the pia covering this tumor. There was not the slightest indication of a definite line of separation between the tumor and the cortex. Removal was evidently impossible. A small bit of this tumor was removed, for diagnosis. A second pathological change noted was a definite thickening of the pia along the blood vessels and a rather unusually large accumulation of fluid right along the vessels, beneath the pia. This condition present was quite characteristic of the condition so frequently seen in epilepsy. By means of a needle the pia was opened in many of these places and a large amount of spinal fluid was mopped out. Exploration from margin of the incision revealed no evidence of another glioma present. There were no adhesions between the dura and the cortex. The flap of dura was sutured back into proper position. By means of a large giant forcep, decompression was made beneath the temporal muscle. This was made by dividing away the temporal bone, both from the flap that was turned down to the thin bone that extended down under the temporal muscle. A large decompression area was made. Immediately beneath this a star-shaped slit was made in the dura. The bone flap was then returned to its proper position after a drain having been placed beneath it and brought out through the trephine opening posteriorly."

"Pathological Report. Specimen is made up of small, round, oval cells slightly irregular in size and shape, composed of a rather vesicular nucleus and of a cell body which is not very prominent and blends into a net-work of glial fibrils, which communicate with those of the neighboring cells. Here and there one sees an occasional large cell which tends toward the pyramidal type of motor cortical cells. Diagnosis:—Brain glioma."—(Dr. Duffy).

Since his return from Baltimore he has had convulsions daily, usually two or three mild ones, but at times several hard ones. Consciousness at one time was lost for a day, during which he had ten or twelve hard convulsions. The eyes are normal, the urine clear, and the signs of increased pressure have disappeared. He is gradually losing weight and the convulsions are becoming more severe.

CORRELATION OF SYMPTOMS.

By means of exploratory operation we have here the definite knowledge of a glioma in the left motor area. Hence, the outstanding feature of the case is the convulsions—typical Jacksonian epilepsy. This was the earliest symptom. They have been so distressing to the patient that he has repeatedly threatened self-destruction, and their control has been an increasingly difficult problem for his physician. As an early sympom convulsions are a manifestation of irritation of the pyramidal cells of the motor cortex by the ingrowth of glial cells. Provided no accident occurs to terminate the patient's life, we may expect paralysis in the affected muscles when the pressure upon the pyramidal cells in the tumor area becomes great enough to inhibit their activity.

If one studies the spasming area seen in a convulsion he can readily approximate the location and size of the tumor in the Rolandic area, as stated in the hospital report.

The paranesthesias might be taken to indicate some post-Rolandic involvement, which could not be extensive since no astereognosis, alexia, agraphia, aphasia, apraxia or auditory involvement were noted. Recently there have been indications at times of aphasia—motor involvement—no doubt due to extension of the tumor into the speech centre. The attacks of severe convulsions that have occurred at three different times have no doubt been caused by hemorrhages into the glioma, thereby increasing the neighborhood irritation as well as the intra-cranial pressure. It was at these times that the slow pulse, headache, vertigo, nausea and vomiting were most marked. Such cases are noted for occasional remission of the symptoms, especially upon treatment by iodides.

The case is typical of motor area involvement and for anyone who had noted the general symptoms and had been lucky enough to observe a conclusion, the diagnosis should not have been in doubt.

A review of the whole case hardly warrants a diagnosis of latent syphilis, and it would seem that the positive luetin test obtained was an error. The remission of symptoms under antiluetic treatment was probably due to the action of the potassium iodid in lessening the edema about the tumor. I have no explanation to offer for the disappearance of the pyuria while he was under this treatment.

CASE III—TUMOR OF THE PITUITARY REGION.

Sr. F. M., Mexican, age 28, married, wife and 5 children healthy. Family history negative. Present trouble began in November 1915, with attacks of headaches accompanied by nausea and vomiting, though he states that previous to this he had noticed failing memory and that at times he was unsteady or dizzy (borracho). About March, 1916, he began noticing failing vision, first in the left field of the left eye, later in the left field of the right eye. He remembers this because of his inability to see moving objects on his left side. His vision failed steadily, the left eye always worse than the right. Headaches and

vomiting continued intermittently for the next eight months, resisting all treatment. In July he had three or four attacks in which for a short time he lost consciousness, but had no convulsion. About September exophthalmos was noticed.

In November he consulted Dr. E. R. Carpenter about his eyes. The original nausea and vomiting were still present, and he had lost some thirty pounds weight. Exophthalmos was extremely marked, and he was so nearly blind that he had to be led about. The eyes showed an almost complete optic atrophy, upon which a choked disk had developed. Upon this was based a diagnosis of tumor.

The general examination was negative, except for an exaggeration of the tendon reflexes and eye reflexes corresponding to the local conditions, reacting neither to light nor accommodation.

His serum Wassermann was negative as were also the blood counts. The spinal fluid gave a negative Wassermann, cell count 10, globulin double plus, and normal Fehling. The X-ray by Dr. Catheart showed an excavation of the sella turcica. About this time there appeared a glairy mucus discharge from the nasopharynx and the exophthalmos seemed to diminish. There was marked insomnia, also much dizziness and restlessness. His mental condition showed impairment—power of memory and concentration failing. He was placed in the hospital and a right sided sub-temporal decompression done at the clinic of the Southwestern Medical and Surgical Association last December. Following this the choked disk returned almost to normal but there has been no improvement in vision. The nausea and vomiting ceased and the headache diminished. The insomnia became less and there has been a general feeling of improvement.

The examination at present shows total blindness. The headaches are again increasing in severity and there is occasional nausea and vomiting. Exophthalmos is slightly more noticeable and the choked disk shows a tendency to return. There has been no change in the sense of smell (anosmia). Sexually there has been no marked change; probably no more than should be expected from any man with his degree of distress. Since six months ago he has noticed a tendency to impotence. A test of his sugar tolerance has been made. He was given 200 grams of glucose at one meal in addition to the regular starches and sugars of his daily diet. No sugar appeared in the urine. He was then given 320 grams with the same result. This was followed by 320 grams of dextrose. The urine passed during the day contained no sugar.

DISCUSSION OF SYMPTOMATOLOGY.

Among the many features of this case the eye conditions are at once the most interesting, and probably the most distressing to the patient. Tumor having been diagnosed from the general symptoms, the development of a primary optic atrophy would lead one to look for direct pressure on the optic nerve. The early left homonymous hemianopsia localizes this pressure upon the right optic tract, probably just posterior to the commissure. In a short time the right fields were also

affected, due to pressure upon the left optic tract, and the resulting atrophy was complete. The later development of choked disk upon the optic atrophy is due to increasing intra-cranial pressure and the sequence is considered pathognomonic of tumor in the region of the optic tracts. Pressure upon the cavernous sinuses aids the mechanism producing the choked disk. This same pressure upon the cavernous sinuses is also the principal cause of the exophthalmos, which results from congestion between the point of obstruction and the eye-ball. Decreased exophthalmos following the decompression could only mean that the general intra-cranial pressure also had something to do with its production.

Considering the location of the pressure it would seem that there might have occurred palsies of the oculo-motor nerves before this time. Some nystagmus is the only indication of possible motor nerve involvement in this case.

Repeated X-ray examinations showed an excavation of the sella turcica with irregular, indistinct outlines to probably three or four times the normal size. This was shown best in stereoscopic pictures, but was plain in single plates.

The mucus discharge from the naso-pharynx no doubt came from the sphenoidal cells following temporary closure of the sphenoidal foramena. The relief that occurred about this time resulted either from discharge of this pent-up mucus or from the tumor breaking into the sphenoidal sinus from above, thus in either case relieving the pressure.

Cushing divides pituitary tumors into three principal groups (1) those with hypopituitarism, (2) those with hyperpituitarism, and (3) those in which the tumor, or neighborhood, symptoms are predominant.

Cases of hypopituitarism show adiposity, increased sugar tolerance, lowered body temperature and reversive sexual changes, or impotence. In children there are sexual infantilism, skeletal undergrowth and psychic disorders. Injections of posterior lobe extract cause emaciation.

Hyperpituitarism shows gigantism in children and acromegaly in young adults; decreased or decreasing carbohydrate tolerance; adiposity; hypertrichosis; and skin changes.

The case before us evidently belongs to the third, or tumor symptom class. The symptoms have been of short duration and marked intensity and without striking signs of dyspituitarism. The increased carbohydrate tolerance is the only important sign of hypopituitarism. The great improvement in the symptoms and disappearance of the choked disk following the decompression were something of a surprise, as so much relief had not been expected. Improvement in vision of an atrophic nerve could not be expected. That this improvement is to be of short duration is indicated by the present return of symptoms. It does not seem that so much returning pressure could come in so short a time from the tumor growth alone. It is highly probable that the tumor

growth has pressed upward closing the foramina of Monro, thus causing an internal hydrocephalus of the lateral ventricles, and rapidly increasing the intra-cranial pressure. No doubt a larger decompression would have given relief for a longer time.

The present indication is to give relief by further decompression, either of the left temporal area or of the sphenoid over the tumor. The latter has the advantage that it may give longer continued relief if the tumor is malignant, and in case of a non-malignant tumor or cyst it might even be curative. The trans-sphenoidal operation has been perfected through the contributions of a number of surgeons, until the mortality directly attributable to the operation has been reduced to about 15%. The principal causes of death have been meningitis, intracranial hemorrhage and increased pressure phenomena.

INDUSTRIAL INSURANCE.

BY
DR. ROBT. FERGUSON, of Bisbee, Ariz.

President's Annual Address before The Arizona Medical Association, Douglas, April 18th, 1917.

During the past two years, the American association for labor legislaiton has been educating the public on the subject of Compulsory Health insurance; this same organization was instrumental in giving us workingmen's compensation laws, in about three-fourths of our states.

The United States Public Health service is also interested in this question, and Rupert Blue says it is bound to be the next great step in social legislation and it will be one of the big questions for our profession to face in the near future.

Germany, under Bismarck and Great Britain under Lloyd George, and several other European countries have adopted this system, and in spite of many difficulties, the results have been good to the extent of giving adequate medical attention to the workingman for a small expenditure of money.

Bills for compulsory health insurance have been introduced in New York, New Jersey and Massachusetts, and although none have passed as yet, it is probable that with further education of the public as to its advantages, their success may be assured; it may not be a matter of common knowledge that such a bill was introduced in our own state at the meeting of the last legislature, but was killed in committee; the Christian Scientists were familiar with this bill and were most active in their efforts to defeat it.

I do not think that any one will object to the principle of health insurance any more than they would to life insurance; it would seem a sensible thing for the workingmen of small means to pay a certain premium to some insurance carrier so that they would receive some money benefits when not able to work and be able to afford proper medical attention.

It is claimed that this will not be done voluntarily and therefore must be obligatory; in fact Belgium had a form of subsidized voluntary insurance, but was preparing to make it compulsory just as the war broke out.

The proponents of this measure start with the assumption that three parties are responsible for the sickness: the employer, employee and public. For example, the employer is responsible for sickness due to long hours of labor, excessive fatigue, bad condition of ventilation, light, etc.

There is an occupational hazard, as is shown by loss of days from sickness per year, which in one place was found to be four day for clerks and salesmen, twelve and a half days for iron and steel workers and fourteen and a half for refiners in sugar factories.

The employee is responsible for the sickness due to improper hygienic environment in the home, injurious habits, poor diet; the public for improper housing, impure water and food; it is estimated that we have in this country about thirty million wage earners, that each loses an average of nine days a year from sickness, making the annual loss at two dollars per day to equal eight hundred million dollars; this is certainly a great economic loss for the country.

Because of this division of responsibility, a bill has been framed to make each party share in the cost; the employer and employee each to pay two-fifths and the public one-fifth of the cost.

It is claimed that the majority of workingmen do not receive wages enough to be able to set aside something for a rainy day, and when sickness comes they are easily forced over the border line from self-respecting wage earners to those who are destitute and objects of charity. We are told that only the rich and very poor receive adequate medical attention; the rich can afford to pay for it and the poor receive it in our charity hospitals.

Health insurance is supposed to apply only to wage earners and therefore would not do away with the large amount of charity work which is always to be done.

There is an elaborate machinery for administering the funds which I will not take up your time with, except to point out that each small district has control of and administers its own funds and it is provided that there shall be representation of medical men and health boards on all committees; the one essential and indispensable thing is to have the doctors to do the work.

The model bill calls for a panel of doctors in a certain area or district, on which any duly registered doctor may be enrolled; there is to be free choice of physicians up to certain limits, not more than five hundred families to one doctor, and a doctor may refuse any patient choosing him if he so desires, but having once accepted, he must answer that person's calls for a certain definite time.

The duties will be to give ordinary medical care at home or in the office; in addition there are to be dispensaries for consultation and special treatments, in fact places for group medicine; there must also be hospitals for those needing such care.

There is to be a separation of the function of certification and treatment, that is, there shall be in each district a full-time medical officer who shall certify when a patient shall receive benefits or go back to work; both

treatment and certification have been done by the same man in Germany and this has been the cause of much difficulty and strife.

In payment for services, three methods are possible, by capitation, visitation or a combination of the two, or by salaried physicians.

By capitation the doctor receives so much per patient per year; this is the method of lodge practice and is the method employed in England; this method is pretty generally disliked, both by doctors and people; it produces hurried work of poor quality.

The method of visitation is better; by this method the doctor charges up each visit against the funds; this is more expensive but has worked all right in some places.

The minimum benefits under this act are as follows:

1. Medical, surgical, dental and nursing attendance and treatment.
2. Medicines and medical and surgical supplies, as eye glasses, trusses, crutches, etc.
3. Sick benefits equal to two-thirds wages.
4. Maternity benefits.
5. Funeral benefit, up to one hundred dollars.
6. Medical and surgical attendance and supplies for dependents.
7. Laboratory facilities and specialists.

This attendance shall not be for more than twenty-six weeks in any consecutive twelve months.

Irving Fisher says that health insurance is needed to tide workmen over grave emergencies incident to illness, to reduce illness itself, lengthen life and abate poverty, improve working power and so raise wage level and diminish causes of industrial discontent.

Disraeli said "The public health is the foundation on which reposes the happiness of a people and the power of a country." This is an age of co-operation, and health insurance is simply the co-operating of individuals for the better care and protection of the health of their members.

There is no doubt that it will stimulate measures for the prevention of diseases, as the workingmen's compensation laws produced the Safety First movement, so it is expected that compulsory health insurance would produce a Health First movement; the employer and employee co-operating with health officer, would be vitally interested in prevention of disease; poverty would be decreased, life lengthened and some of our social discontent would vanish when employer and employee were brought together on a common ground in health insurance work.

It is much harder to feel satisfied as to the effect of this system on our profession; it has been said that few things were more surprising to the public than the unexpected threatening attitude of the medical profession in Great Britain.

The community has been so accustomed to regard medical men as amiable weaklings in business matters, easily gulled by piteous tales or flattering remarks about the magnanimity of the profession, that a strike of doctors seemed amusing to them.

The same was true in Germany where a union of doctors was formed and a strike successfully carried out in at least one city.

The doctors were taken into this thing without their consent and without proper representation in the organization, and because they had always done much charity work, were supposed to do this work for very little pay as it was essentially work for poor people.

It was not realized that the cost of education for physicians is higher than for other professions, that they have different standards of living from the laborer and must be paid adequately to allow them to live up to such standards; these evils have been corrected as far as possible in the model bills of this country, but there are still other evils which are inherent in the system.

We might find an increase in the average income of physicians as it is claimed in Great Britain, but we would have a loss of the competition which tends to develop better service, and in its place a competition as to who would have the best pull with some union or organization so as to get a certain number or class of patients on his list.

There would be a change from the personal, confidential, friendly relation to a corporate and commercial one; the physician is reduced from a professional man to a salaried worker and member of a trades union.

It is admitted in Great Britain that although a larger volume of work is done than formerly, the quality of the work is not proportionately improved; the physician is more likely to hurry his work and not take special interest in it.

The reason for this is the great demand on his time for treatment of petty ailments or imaginary ones simply because the patient pays a certain fee and it costs nothing to bother the doctor; the patients show no consideration for the doctor and cause him to make numerous calls at disagreeable times and there is no redress; the average employee is an autocrat when he gets the chance and makes a poor boss; there would also be an increase in drugging, for the ordinary laborer is not satisfied with advice but must always have some medicine or appliance to use.

The success of compulsory health insurance depends largely on the physicians, and how can they be expected to enter enthusiastically into this system when they feel they are being exploited and are being asked to go into a form of practice which is degrading and held in contempt and in which there would be a certain loss of independence?

There would be some benefits which appeal to us as medical men besides the ones already mentioned; the lodge doctor and hospital association

would probably cease to exist; the patent medicine and self-drugging evil would be decreased and Christian Science and other issues would be dealt a severe blow.

At the present time there does not seem to be much demand for health insurance from any of those vitally interested. This legislation is slow in materializing, but by an elaborate system of publicity and education may be forced upon us.

It behooves us, therefore, as those who are deeply interested in their profession and who love it for its glorious past and are jealous of its future status, to think well over these matters and to obtain by united action, the best law possible if the necessity is forced upon us.

CONCLUSIONS.

I am opposed to compulsory health insurance because it is an undesirable form of practice which would bring us no respect and would lower our profession to that of a wage-earner; also because committees made up of employer and employee would have control of medical affairs, about which they know nothing.

Second: Unfair to employer: While I believe that employers should be made responsible for all occupational diseases and hazards, proper ventilation, lighting and working conditions, I do not see why he should be responsible for accidents off duty, and most of sickness of employee and family; if wage earner does not get enough to live properly, wages should be increased.

Third: It would not assist the submerged part of the population and would tend to pauperize and discourage thrift and saving in those supposed to be benefited.

Fourth: If the public is to be taxed to furnish medical care to wage earners, there is no valid reason why it should not pay for food, clothing, housing, etc.